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AUTOMOTIVE INDUSTRIES

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AUGUST 13, 1938

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Replaceability of parts is a basic essential of automotive engineering. Schrader pioneered the tire valve with replaceable core more than forty years ago. Today, this type of valve core provides such service and economy to the users of pneumatic tires throughout the world as to make it the auto industry's greatest five cent value.

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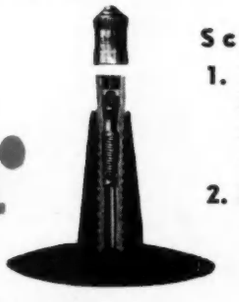

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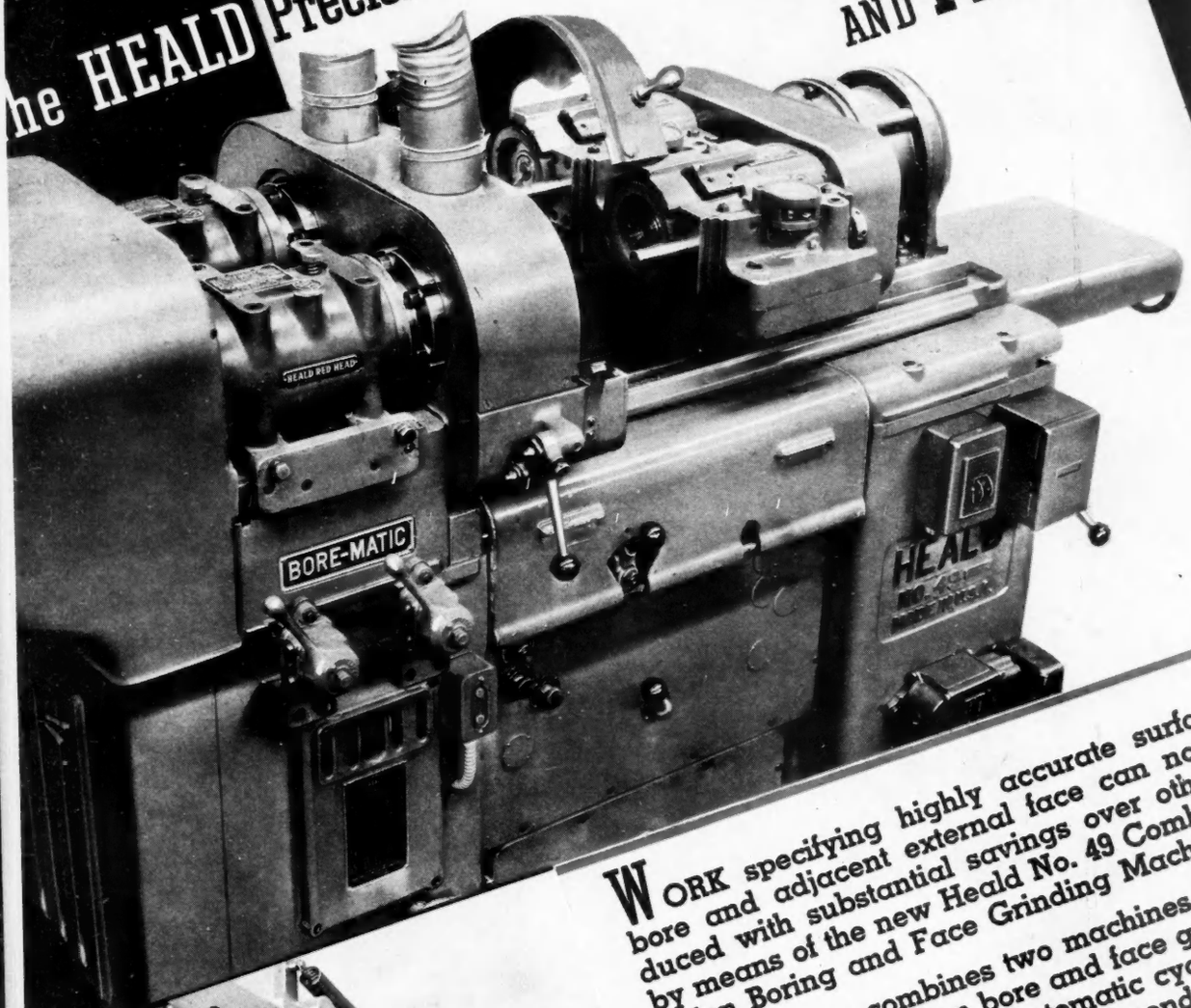
1. Economy. The replaceable parts assure quick inspection and service everywhere. Standardization makes the parts interchangeable regardless of the size or type of tire or valve.
2. Safety. The protection of an air-tight valve cap; the only positive tire valve seal.

A. SCHRADER'S SON Division of Scovill Manufacturing Company, Incorporated **BROOKLYN, NEW YORK**

A New WAY to REDUCE COSTS

the HEALD Precision Boring and Face Grinding MACHINE BORIZES AND FACES IN THE SAME CYCLE



WORK specifying highly accurate surfaces on a bore and adjacent external face can now be produced with substantial savings over other methods by means of the new Heald No. 49 Combination Precision Boring and Face Grinding Machine.

This machine combines two machines in one and is designed to precision bore and face grind such work in a single pass, in an automatic cycle, using single point cemented carbide or diamond tools for boring and a cup wheel for face grinding in a plunge cut. Parts made of one material or two, such as hardened steel gears with bronze bearings, can be efficiently finished.

Two parts can be handled at the same time with tw boring and two grinding operations occurring simu taneously. On this basis this machine will repl two to three machines of single purpose design, resultant savings in costs and floor space. More de of this new development will be gladly sent on re

The HEALD Machine Compan

WORCESTER, MASSACHUSE

Published Weekly
Founded 1895

AUTOMOTIVE INDUSTRIES

Vol. 79, No. 7
August 13, 1938

HERMAN L. WECKLER

. . . appointed to a newly established post as vice-president of the Chrysler Corp. in charge of operations, Mr. Weckler has been in charge of the Chrysler plant's industrial relations. He will continue his present work and will also devote attention to co-ordinating activities of all the corporation's plants.

Production

Immediate Output Picture Brightest for Some Time

Encouraged by a strong nation-wide contra-seasonal upsurge of new car sales and almost unprecedented used car liquidations, the picture for the pending Auto Show season looks its brightest, at least at this juncture. With Chevrolet sales for July rising 11 per cent over June and the last ten days of July showing an increase upward of 22 per cent for one of the independents, the immediate production picture is better than it has been for some time.

Chevrolet continues operations this week, ending Aug. 13, with unslackened pace, promising substantially same rate next week. Estimate of production for all manufacturers for week of Aug. 13 places total output at around 15,500 units, with Chevrolet, Nash, Hudson, and Studebaker among those reporting. Studebaker will produce some truck units this week but is expected to stop car assemblies.

Evidence that shortage of both new and used cars will develop before the 1939 models are available is strongly indicated in the report published in the August issue of the NADA bulletin, just released. Dealers reflect an optimistic attitude, predicting better business and larger sales during the last quarter of this year. This is predicated, generally, upon the exceptionally good crop prospects plus benefits expected from federal spending programs. The survey shows that reporting dealers, located in every section of the U. S., have roughly an average of 25 new units per dealer on hand. This is given as about a 37-day supply as of Aug. 1. The same group reports an average of 45 used units on hand per dealer, approximately a 44-day supply.

(Turn to page 190, please)

June Auto Financing Lower

The dollar volume of retail automobile financing as reported by 456 organizations, totaled $92,818,941 in June, compared with $94,917,454 in May and $193,728,106 in June of last year, the Department of Commerce reported this week.

The volume of retail financing for the first six months of the year aggregated $516,200,951 compared with $949,738,750 during the same months of last year, the report said.

The dollar volume of wholesale auto financing in June totaled $74,212,781, compared with $85,744,420 in May and $180,318,827 in June of last year.

For the first six months of the year wholesale financing amounted to $501,262,860, compared with $1,041,295,486 in the same months of last year.

Murray Corp. Shows Loss

The Murray Corp. of America, Detroit, reported a net loss of $290,357.78 for the first six months of 1938. The same period in 1937 revealed a profit of $671,140.23.

AUTOMOTIVE INDUSTRIES

Summary of Automotive Production Activity
(Week Ending Aug. 13)

BUSES No indication of a noteworthy change in the tempo of current operations which in general appear to be averaging 50 per cent capacity.

TRUCKS Unexpected strengthening in sales stimulated activity; a surprise to some producers who had anticipated no upturn for at least two months to come. Sentiment seems to be "bright prospects for fall."

TRACTORS Labor difficulties especially disturbing to one large manufacturer. No increase apparent in volume of orders.

AUTOMOBILES Opinion fairly general that there will be a shortage of both new and used cars pending the Automobile Show season. Two large producers will continue production of 1938 models into the week ending Aug. 20. Many parts and vehicle manufacturers are beginning to call back thousands of tool and die workers to start 1939 programs.

MARINE ENGINES Tone of business holding firm. Large builders' comments vary widely as one states "we expect orders to decrease" and another advises "we have clinched considerable business that will come through within 30 days."

AIRCRAFT ENGINES Capacity operations characterize this industry. A mid-west engine builder, specializing in small radial engines, revealed new order for large quantity of engines beginning in 30 days.

This summary is based on confidential information of current actual production rates from leading producers in each field covered. Staff members in Detroit, Chicago, New York and Philadelphia collect the basic information, in all cases from official factory sources.

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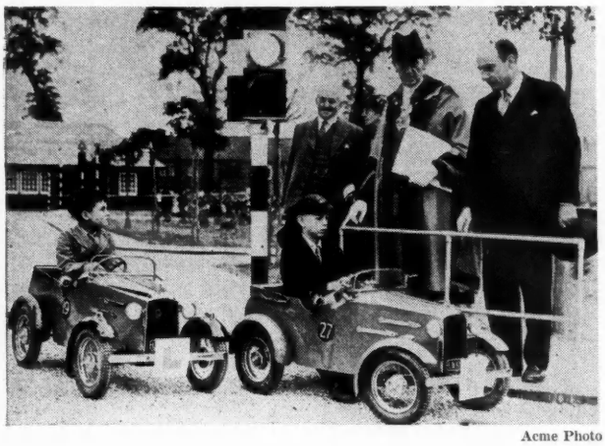


Acme Photo

EARLY START

Minister of Transport Leslie Burgin gives advice to a young motorist after officially opening the first model traffic area built in Lordship Park, Tottenham, England, to teach local children traffic safety. In an area of four acres, miniature main and secondary roads have been constructed, and the children drive their own vehicles on the highways.

Finance "Peace" Hope

Tentative Consent Decrees May Lead to Out-of-Court Settlement

According to reports from the Department of Justice, anti-trust division, Washington, it appears that "substantial progress" is being made toward "peace" between the government and the Ford and Chrysler companies now under indictment for alleged unfair practices in the automobile financing field. Following a long-established practice of attempting to obtain out of court settlements in anti-trust cases, the division has been negotiating for several weeks with attorneys of both companies as well as with the General Motors Corp., which also was named in the indictments. While long conferences have been held no consent decree has been entered into by the government with any of the three companies, although tentative consent decrees reported have been drawn up between the Department and the Chrysler Corp. and the Ford Motor Co.

A year ago similar negotiations reached the consent decree, but the case was thrown out of federal court in Milwaukee by Judge Ferdinand Geiger. The federal indictments in the district court, South Bend, were returned two months ago.

A.S.M.E. Fall Meeting

A symposium on rubber will be sponsored by the committee on rubber and plastics at the fall meeting of the American Society of Mechanical Engineers, to be held at the Providence-Biltmore Hotel, Providence, R. I., Oct. 5-7.

The papers to be presented at this meeting will particularly emphasize mechanical problems in the production and use of rubber. These are: *Session* 1, Oct. 5—2:00 p. m., 1. *The Engineering History of Rubber*, by Dr. W. C. Geer, Ithaca, N. Y.; 2. *Synthetic Substances with Rubberlike Properties*, by E. R. Bridgewater, E. I. du Pont de Nemours & Co., Wilmington, Del.

Session 2, Oct. 6—2:00 p. m. 1. *Problems in the Production of Rubber*, by E. G. Kimmich, Goodyear Tire and Rubber Co., Akron, Ohio; 2. *The Mechanical Characteristics of Rubber*, by F. L. Haushalter, B. F. Goodrich Co., Akron, Ohio.

The committee on rubber and plastics will meet in the evening of Oct. 5 to discuss projects for 1939 and 1940. Technical representatives of companies engaged in either the production or use of rubber and plastics are invited to attend.

On the afternoon of Oct. 6, following the second session, A.S.M.E. members and visitors at the convention will be entertained with an inspection trip through the Providence plant of the U. S. Rubber Co.

Willys Workers Recalled

Willys-Overland, Motors, Inc., began recall of 1000 workmen Aug. 10 and expects to have assembly line operating by Aug. 22, it was announced by David R. Wilson, president. Machine shop and body departments will be first to start.

Some units have been operated during the recent closedown of the assembly. Shortage of certain body types since announcement July 21 of price reductions was cited as cause for the reopening. Only 1938 models will be made. Plans are to continue production until fall inventory and model change period.

Export Orders Now Major Source of Business

The Bureau of Foreign and Domestic Commerce said last week that export orders have been a major source of business in many lines of domestic activity, pointing out that approximately one-half of the new business of machine tool manufacturers during the first half of 1938 has been in export sales.

Other principal exports cited by the bureau as showing relatively large increases through June were metal-working machinery, tractors and other agricultural implements, petroleum and gas-well drilling apparatus, road building and other construction machinery, locomotives and other power-generating equipment and aircraft.

Only part of this favorable showing may be traced to rearmament activity abroad, the bureau said, since increases have occurred in a number of exports that are, if at all, remotely affected by rearmament programs abroad.

Studebaker Plant to Reopen

Studebaker officials have announced that production would again be started Aug. 20 in the South Bend plants after a three weeks' shutdown. Officials of the corporation, who declined to be directly quoted, said that prospects for the future indicated that a large force of men would be reemployed for a goodly number of hours a week. Personnel units at the corporation are said to have started returning the non-productive employes to their jobs in small numbers this week. Only men laid off in the recent shutdown will be employed.

. . . *slants*

TAXES—*The American Petroleum Industries Committee reports that State gasoline tax increases tend appreciably to reduce the operation of motor vehicles. A study covering the years* 1930 *to* 1937 *indicated that in those States in which the tax increased, gasoline consumption showed a relatively greater decline during the depression and a less rapid recovery. In the same period, gasoline consumption increased* 35 *per cent more in the States in which gasoline taxes were not increased.*

EUROPE—*At the end of* 1937 *there were* 8,200,000 *cars in use in Europe, according to the Federation of Automobile Manufacturers Associations. The increase of* 7.5 *per cent over* 1936 *was ascribed to the general revival of business and to governmental encouragement of motorization.*

(See next page)

REICH—*Between January and June this year, German factories sold* 143,328 *cars—an increase of* 6 *per cent over the same period last year. The increase was accounted for solely by a rise in exports. While sales in the domestic market dropped* 1.4 *per cent, exports increased* 30.3 *per cent, it was reported.*

MORE SPARK—*Sales of spark plugs for replacement purposes during the month of July were the highest in the* 30 *years' history of the AC Spark Plug division of General Motors, Wilson S. Isherwood, general sales manager, said. He declared the increase may be significant as spark plug sales usually are a barometer of activity in the automotive parts and equipment industry.*

Increased Aircraft Certificates

There were 9,372 aircraft holding active Department of Commerce certificates on July 1, 1938, according to an announcement by the Bureau of Air Commerce, Department of Commerce. On July 1, 1937, there were 7,914 certificated aircraft.

The total number of aircraft, certificated and uncertificated, of which the Department had record on July 1, 1938, was 11,031, while this number on the corresponding day last year was 9,680. Uncertificated aircraft (bearing identification marks only) totaled 1,299 on the first of July this year.

Labor

Strife Continues as "Purge" Jury Ousts UAW Officers

Internecine strife which bids fair to split the ranks of the UAW continues unabated this week. Major development over the week-end was expulsion of four international officers and suspension of a fifth by Homer Martin's special "purge" jury. Three international vice-presidents expelled by the executive board are Richard T. Frankensteen, Ed Hall, and Wyndham Mortimer. George F. Addes, secretary-treasurer, had been expelled previously. At the same time, the fourth of the quartet of international vice-presidents, Walter N. Wells, was suspended without pay for three months.

Meanwhile charges and countercharges have been aired in the daily press, further straining the bonds of union solidarity. Detroit police were called in to investigate a report by the group supporting Homer Martin, that the offices of three executives of the UAW had been ransacked, allegedly by the opposition.

Latest developments before going to press this week was announcement that the expelled executives would carry their grievances before the rank and file. In a bold maneuver, which amounts to a showdown of the respective strength of the two warring elements, the dissenters laid plans for a meeting of presidents of UAW locals throughout the nation, to be held in Toledo. If this meeting lends support to the cause of the expelled executives, it is expected to lead to a national convention at which all issues can be debated.

Factory Sales Estimated at 1,454,200 for Seven Months

Total factory sales of passenger cars and trucks in July are estimated by the Automobile Manufacturers Association at 148,200 units, bringing the total for seven months to 1,454,200.

Dealer stocks were reduced during June by a further 38,370 units. The net reduction in field inventories for the first six months was 161,000 units. Last year, during the corresponding period, dealer inventories increased by nearly 132,000.

The decline in retail distribution of motor vehicles from May to June was 15 per cent.

Compared with the first half last year, retail sales were 51 per cent lower, while factory sales to the domestic market declined almost 60 per cent.

June sales of 38,145 to foreign markets brought the six months' total to 288,847 cars and trucks. This represented a decline of 23 per cent as compared with the first half of last year. The foreign market accounted for 22 per cent of the total, whereas last year it took but 13 per cent of the total output.

Automobile Sales Figures

1938		Total[1] Factory Sales (U. S. & Canada)	U. S.[1] Domestic Market	Foreign Market[2] (Incl. Canada) Number	Foreign Market[2] (Incl. Canada) %	Retail[3] Sales in U. S.
JULY	ESTIMATED TOTAL	148,200[3]				
JUNE	Cars	147,545	123,333	24,212	16.4	155,811
	Trucks	41,854	27,921	13,933	33.3	33,813
	Total	189,399	151,254	38,145	20.5	189,624
1st 6 Mos.	Cars	1,012,619	827,085	185,534	18.3	971,988
	Trucks	293,413	190,100	103,313	35.2	206,294
	Total	1,306,032	1,017,185	288,847	22.1	1,178,282
1937						
1st 6 Mos.	Cars	2,383,810	2,136,591	247,219	10.4	2,036,347
	Trucks	533,059	403,801	129,258	24.2	372,203
	Total	2,916,869	2,540,392	376,477	12.9	2,408,550
YEAR 1937	Cars	4,068,935	3,643,386	425,549	10.4	3,483,429
	Trucks	947,502	689,674	257,828	27.2	643,495
	Total	5,016,437	4,808,974	683,377	13.6	4,126,924

Sources: [1]U. S. Census Bureau. [2]U. S. Census Bureau and Dominion Bureau of Statistics. [3]Automobile Manufacturers Association.

Estimated Dealer Stocks of New Passenger Cars

1937	January	February	March	April	May	June
Production—U. S. Domestic Market†	285,749	276,469	376,245	410,592	400,415	387,121
Retail Sales—U. S.‡	249,715	216,770	409,205	387,887	407,610	365,160
Change in Inventory	+36,034	+59,699	−32,960	+22,705	−7,195	+21,961
Inventory, first of month	248,200	284,234	343,933	310,973	333,678	326,483
1937 (continued)	**July**	**August**	**September**	**October**	**November**	**December**
Production—U. S. Domestic Market	341,189	299,496	110,122	273,753	269,580	212,655
Retail Sales—U. S.	347,120	310,312	192,967	212,651	212,389	171,643
Change in Inventory	−5,931	−10,816	−82,845	+61,102	+57,191	+41,012
Inventory, first of month	348,444	342,513	331,697	248,852	309,954	367,145
1938	**January**	**February**	**March**	**Apr**	**May**	**June**
Production—U. S. Domestic Market	130,273	119,896	153,316	160,028	140,239	123,333
Retail Sales—U. S.	126,442	120,348	188,325	193,392	187,306	155,811
Change in Inventory	+3,831	−452	−35,009	−33,364	−47,067	−32,478
Inventory, first of month	408,157	411,988	411,536	376,527	343,163	296,096
1938 (continued)	**July**	**August**	**September**	**October**	**November**	**December**
Production—U. S. Domestic Market	.....	.....	.....	.....	.....	.....
Retail Sales—U. S.	.....	.....	.....	.....	.....	.....
Change in Inventory	.....	.....	.....	.....	.....	.....
Inventory, first of month	263,618	.....	.....	.....	.....	.....

†—U. S. Census Bureau. ‡—Automobile Manufacturers Association

Ourselves and Government

A weekly check list of legislative, executive and judicial actions affecting the automotive industries. First appeared in June 25 issue, p. 831. Corrected to Aug. 11

CONGRESS

Adjourned June 16, sine die. All members of House and 36 Senators retire or face election in Autumn.

Legislative Legacies

MONOPOLY INVESTIGATION. Public hearings by the National Economic Committee (the anti-monopoly committee) may be started in October instead of September as previously planned.

AIRLINES. The five-member Civil Aeronautics Authority, Administrator Clinton M. Hestor, and two members of the Air Safety Board was sworn in on Aug. 8 with the statement by Chairman Edward J. Nobel that the board "hopes to promote through high safety standards, the public's growing confidence in air transportation." The Authority, which is given broad administrative and regulatory powers over air commerce under the McCarran bill (S. 3845) passed by Congress, will spend its time until Aug. 22, the effective date of the new act, laying plans for a detailed system of administering air-mail contracts, supervising commercial air lines and private flyers, studying aviation safety measures, and making other initial organizing plans.

Charles S. Guthrie, SEC counsel and formerly connected with Niles-Bemont-Pond Co., machine tool manufacturers, has been named general counsel. Paul J. Frizzell, deputy general manager of the HOLC, and naval aviation aide during the World War, was named secretary.

WAGES & HOURS. Elmer F. Andrews, New York State Industrial Commissioner, who has been named administrator, is expected to go to Washington later this month to start preliminaries under the Fair Labor Standards Act. Indications are that the Labor Department, spurred by Secretary Frances Perkins, is anxious to have States pass supplemental wage and hour laws to fortify and broaden the whole wage-hour program. Less than six States now have minimum wage laws and in only two—Pennsylvania and Oklahoma—do they apply to both men and women.

DEPARTMENT OF JUSTICE

MONOPOLY. Tentative consent decrees reportedly have been drawn up between the Department and the Chrysler Corp. and the Ford Motor Co. and presumably are to be submitted to independent finance companies before details are made public and before being submitted to the Federal court in South Bend, Ind., for approval.

DEPARTMENT OF LABOR

AIRCRAFT LABOR. Public contracts board has withdrawn recommendations to fix a 60-cents-an-hour minimum wage rate for workers in the aircraft manufacturing industry pending a supplementary public hearing scheduled for Sept. 8 in Washington. Initial hearings were held last March. After final order is issued, manufacturers, in order to be eligible for Government business will not be permitted to pay less than the prescribed minimum rate.

STEEL LABOR. After hearings July 25-26 on SWOC demand that minimum common labor rates per hour in steel industry be fixed at 62½, 60 and 45c. in the east, west and south, respectively, the Board set Aug. 8 as the deadline for filing wage data and Aug. 22, for filing briefs. Final action not expected before late September and may apply to Ford steel plants. Board eventually plans to cover all industries doing Government business, including the automobile industry, although it may be among the last to be considered.

CONTRACTS. Public Contracts Board announced contracts totaling $412,005.69 for transportation equipment as reported by three Government Departments during the week ending Aug. 4. They were United Aircraft Corp., East Hartford, Conn., $197,505 for propellers and $14,351.21 for airplane parts for the Navy Department; General Motors Corp., Chevrolet Division, an estimated $186,571.89 for CCC trucks, and an estimated $13,577.59 for Agriculture Department trucks.

WAR DEPARTMENT

EDUCATIONAL ORDERS PROGRAM. Brig. Gen. Henry H. Arnold heads a group of seven named by Assistant Secretary of War Johnson which will have charge of preparation and placing of orders. Automobile manufacturers may receive the first orders, probably in September, under the program which seeks to familiarize industrial firms with the country's war-time requirements and thus speed industrial mobilization in event of an emergency.

LABOR RELATIONS CASES

FORD VS. N.L.R.B.: Last report A. I., June 25, P. 828.

Francis M. Shea, trial examiner, announced findings that the Ford Motor Co., allegedly discriminated against employees for union activities. He listed eight specific unfair labor practices for which he said the company was responsible and recommended reinstatement with back pay of 50 employees at the Buffalo plant.

If the recommendations were accepted by the company, the Board said the company must post cease and desist notices for 30 days at the Buffalo plant and send a compliance report to the NLRB regional director in Buffalo before Aug. 8. The Board said that failure to comply would result in transfer of the case to the Washington office.

This week the Washington office stated that the Ford Co. had been given until Aug. 25 to file exceptions in Washington to the intermediate report of trial examiner Shea.

NLRB has certified the AF of L's machinists union (IAM) as exclusive collective bargaining agency for employees of the Consolidated Aircraft Corp., San Diego, Calif., as a result of a July 11 election at which the AF of L union polled 1098 votes as against 487 for the CIO's UAWU.

NLRB has scheduled an election over the objections of Board Member Edwin S. Smith to permit pattern makers at the Walworth Co., Greensburg, Pa., to choose between an AF of L pattern makers craft union and the SWOC's iron, steel and tin workers union.

NLRB has scheduled a run-off election at the Unit Cast Corp., Toledo, to make a final determination of an election held May 24 at which neither the International Molders Union, Local No. 425, nor the CIO's iron, steel and tin workers union received a majority vote.

FEDERAL TRADE COMMISSION

INVESTIGATION under the Withrow-Minton Resolution (M. J. Res. 351) may be taken under the wing of the anti-monopoly committee and financed through an allocation from the $400,000 fund which Congress voted to place at President Roosevelt's disposal for distribution to executive department agencies conducting the anti-monopoly survey. Congress rushed away without appropriating the $50,000 called for in the resolution and although the FTC has denied it was hard pressed for funds, anti-monopoly committee aides concede that such an allocation could be made and that the work of investigating manufacturer-dealer relations in the automobile industry lies well within the scope of the committee's authority.

CALCIUM CHLORIDE ASSOCIATION of Detroit, and four members of the industry whose product was described as a dust-laying agent, road construction aid, and curing agent for concrete, have been charged in an FTC complaint with allegedly conspiring to fix prices and employing other unlawful methods of restraining and eliminating competition.

THE WABER CO., of 2324 S. Michigan Ave., Chicago, has entered into a stipulation with FTC, agreeing to discontinue alleged use of the term "puncture-proof" in selling its tires and the representation that its tubes are the only ones on the market whose construction includes mastic gum rubber over the protected section of the tube.

F.O.B. PRICES case vs. G.M. and Ford. Date for hearing expected to be fixed for some time in August. Complaint alleges advertising misleading because prices do not include standard equipment.

VS. GENERAL MOTORS on question of forcing dealers to purchase parts and accessories from G.M. sources only. Hearings scheduled to be resumed in New York on July 26 have been postponed until August 16. Everett Haycraft is FTC attorney in charge.

SIX PER CENT CASE. F.T.C. cited Ford and General Motors in July, 1937,

Advertising News Notes

Lee Anderson Advertising Company, Detroit, announces the addition to its staff of Haldeman Finnie, for the past four years Manager of the Refrigeration Division of the National Electrical Manufacturers Association.

George C. Congdon, well known among automotive and industrial advertising men, has resigned as advertising manager of Jones & Laughlin Steel Corp., to join Townsend & Townsend, New York agency. The steel company was one of the agency's first accounts. R. M. Gibbs succeeds Mr. Congdon at J & L.

George Wilcox, formerly with Nash, and earlier with General Motors, has joined the editorial staff of Jam Handy Organization, producers of advertising and industrial movies.

Twelve divisions of Greyhound Lines have received copies of a three-reel film for bus travel promotion, called "Travelogue."

Prospects of bumper crops are interesting advertising agencies handling automotive and farm equipment accounts. International Harvester is promoting among dealers and in farm papers, and Oliver is planning a vigorous 1939 campaign. Other companies are planning to revive dealer interest in their products for the farm belts.

Skelly Oil Co. will invade the New York territory. Blackett-Sample-Hummert, Inc., will handle the drive through a chain which formerly handled Texas products.

Dee-Jay Mfg. Co., Detroit, makers of replacement grilles for automobiles, has named Whipple & Black Advertising Co. of that city, its agency.

It was felt in advertising circles that the early date set by Chrysler Corp. for the press preview of its four lines might force other manufacturers to bring out their 1939 models at an earlier date and stimulate the appearance of advertising copy several weeks to a month before its normal time.

Agencies expect a sharp spurt in auto linage before and around show time, as many dealers have been accumulating factory credits, instead of using them in recent months to buck a poor season. Opinion was that linage for the 1939 model year may run as much as 25 to 33 per cent ahead of the 1938 figures.

complaining of false and misleading representations in advertising prices of automobiles. Complaint alleges advertising 6 per cent charge on deferred payments by retail purchasers is misrepresentation because no provision is made for amortization. Case now in hands of trial examiner.

FAIR TRADE PRACTICE rules for retail automobile dealers, introduced at public hearings during last NADA meeting in Detroit (see A.I., April 30, 1938), are still under study by the FTC fair trade practice division headed by George McCorkle. Reports are circulating in Washington to the effect the rules will be sent out to trade members for suggestions and objections shortly. Officials deny the report, insisting that FTC's work on the proposals is far from completed.

INTERSTATE COMMERCE COMMISSION

Effective Oct. 1, the ICC has prescribed a maximum driving day of 10 hours to be followed by an 8-hour off-duty or rest period, or a weekly limitation of 60 hours on duty, for truck and bus drivers of common and contract motor carriers. The Public Health Service has been directed to conduct studies covering the fatigue problem, and the ICC Motor Carriers Bureau will make further studies of accident reports "for the light they may throw on the effects of safety of operation of different periods of duty."

Evidence of Car Shortage Seen in N.A.D.A. Report

Evidence that a shortage of both new and used cars will develop before 1939 models are available is indicated in an analysis of reports submitted by representative dealers to the National Automobile Dealers Association, and published in the August issue of the N.A.D.A. bulletin.

The survey revealed that the reporting dealers, representing all makes of cars and each section of the country, have roughly an average of 25 new units per dealer on hand. This is given as about a 37-day supply as of Aug. 1. These same dealers report an average of 45 used units on hand, or approximately a 44-day supply. If this condition holds true generally, then it would appear that a shortage of both new and used cars may develop prior to October.

Pierce-Arrow Liquidation Sale Expected in Near Future

Liquidation of the machinery and parts of the 1695 Elmwood Ave. Corp., formerly the Pierce-Arrow Motor Corp., Buffalo, will be started "as quickly as possible," executives of the new concern have stated.

Included in the items to be sold will be all machinery other than that used for building maintenance, all tools, office furniture, complete restaurant and hospital equipment and a small printing plant.

The buildings also are up for sale but are not included in the present liquidation plan. The service parts business of the corporation has been taken over by Walter E. Schott of Cincinnati, a former Pierce-Arrow creditor, in liquidation of his loans to the company, it also was announced.

To facilitate the present liquidation, executives of the Elmwood Ave. Corp., which is owned by the Marine Trust Co. and the Federal Reserve Bank of New York, also former creditors of Pierce-Arrow, have engaged the services of the Morey Machinery Co. of New York.

This firm will act in an advisory capacity in the fixing of prices and in advertising policies. Sale of the equipment is expected to get underway shortly. No auction is planned but it is the intention of the Elmwood Ave. concern to accept "any reasonable price offered," executives said.

There are no prospects at present for the sale of the plant buildings, it was said. Several plans have been considered for dividing the buildings but none of these has been found practical as yet.

City Auto Stamping Co.

City Auto Stamping Co., Toledo, reported net profit of $20,683 for the quarter ended June 30, 1938, after depreciation, Federal taxes and all normal charges. A net loss of $4,186 was reported in the first quarter of the year.

Last year the first half provided net earnings of $245,069, or 65 cents a share. Although operations now are from 25 to 30 per cent it was said the second quarter earnings were made on even lower rate of operations.

Fairchild Aviation

Fairchild Aviation Corp. in report for six months ended June 30, 1938, subject to audit and year-end adjustments, shows net profit of $159,508 after charges and Federal income taxes.

Unfilled orders of Fairchild Aviation Corp. on June 30 were $1,530,014 as compared with $1,363,738 on Jan. 1 and $1,341,410 on June 30, 1937, the report stated.

Spicer Loss

Spicer Manufacturing Corp, reported a loss of $151,668 for the six months ended June 30, 1938, as contrasted with net profit of $719,196 before Federal tax on undistributed profits for the like period last year.

Traffic Training Institute Opened in Ann Arbor

With 133 State and municipal traffic officials in attendance, the National Institute for Traffic Safety Training opened at the University of Michigan, Ann Arbor, Monday, Aug. 8. The Institute will run until Aug. 20, and has in attendance police traffic officers, traffic enginers, traffic and safety educators, technicians from the offices of State motor vehicle administrators and safety council executives from 19 States, Canada and New Zealand.

Paul G. Hoffman, president of the Automotive Safety Foundation and president of the Studebaker Corp., in addressing the opening session declared that major credit for the marked accomplishments in traffic accident reduction recorded thus far in 1938, goes to public officials in State and local governments that have perfected their accident prevention facilities and programs.

His address entitled "The New War on Accidents," described the highway safety program of the united automotive industry since its inception in January, 1936, which is now being carried out by the Automotive Safety Foundation.

To Sell Stutz Assets

Carl Wilde, Federal Referee in bankruptcy, said Monday an order would be entered to dispose of the assets of the Stutz Motor Car Co. as a result of a hearing on a creditor's petition for the sale. The date for the sale will be set later.

The trustee of the company reported that its assets were $370,000 in real estate and $86,827 in machinery and other property.

The principal creditor is the Reconstruction Finance Corp., to which $266,000 is owed on a note for $300,000 it was reported.

New Equipment Purchases

The Public Service Coordinated Transport of New Jersey was granted authority, Aug. 10, by the ICC to issue $1,224,000 of serial equipment promissory notes to finance the purchase from Yellow Truck & Coach Manufacturing Co. of 274 new passenger buses. Total cost of the buses will be $1,836,111.

The United States Trucking Corp. of New York was authorized to issue $300,000 of equipment notes to finance the purchase of new motor equipment. The type of equipment to be purchased was not specified.

Retail Tire Stocks Lower Than Year Ago

Although total retail tire stocks in the United States July 1 were slightly higher than on April 1, they were considerably under stocks of a year ago, while stocks of independent tire dealers were substantially less July 1 than as of April 1, according to the Commerce Department's quarterly tire stock census. Dealer stocks July 1 were lower than in any preceding survey, indicating that dealers have been liquidating their stocks and consistently selling more than they have been buying. As independents sell more than 50 per cent of the total retail tire market, this trend is pointed to by manufacturers as indicating an impending rush of dealer ordering to handle the August and autumn consumer tire and tube business.

Dealers, who reported 2,161,000 tires in stock a year ago, had only 1,778,000 tires on their shelves as of July 1 this year. April 1 they had 1,932,000 casings. April 1 of 1937 they had 2,465,000 tires stocked.

Sixty-three oil companies selling tires through more than 40,000 filling stations showed 2,079,000 tires in stock July 1 compared with 1,869,000 April 1, 2,115,000 Jan. 1 and 1,996,000 on July 1 of 1937. Seven tire manufacturers operating 2133 owned retail stores and six chain stores and mail-order houses with 1841 retail outlets reported stocks of 6,013,000 tires July 1 against 5,582,000 April 1, and 6,456,000 on July 1, 1937.

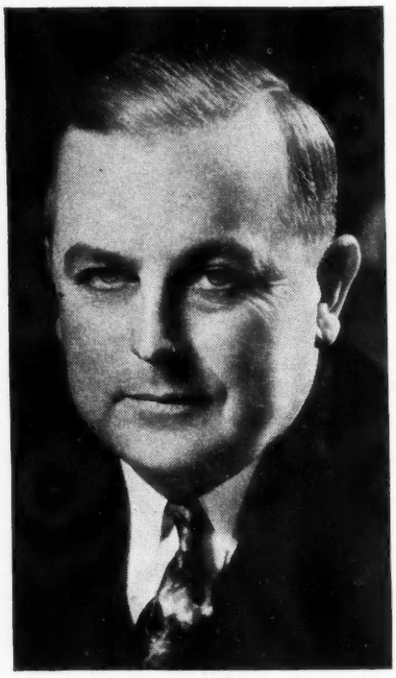
40 Years Ago

with the ancestors of AUTOMOTIVE INDUSTRIES

Exhibition

Interest this fall will center chiefly in the exhibition of motor carriages which is to be held from Oct. 10 to Dec. 3, by the Massachusetts Charitable Mechanics' Association, at their magnificent building (in Boston). Vehicles will be divided into three classes: steam, hydrocarbon and electric. Free current will be given electric exhibitors to the extent of a 10 mile run each day, while steam and gasolene motor exhibitors will find fuel and supplies ready to hand.

From *The Horseless Age*, August, 1898.



CARL BREER

. . . executive engineer and member of the board of Chrysler Corp., has just become a member of the board of directors of the American Standards Association, nominated by the Automobile Manufacturers Association.

Mr. Breer, who has been in charge of the Chrysler engineering research laboratories since the corporation was founded, is also vice-president of the Chrysler Institute of Engineering, and of Airtemp, Inc.

General Motors July Car Sales

July sales of General Motors cars to dealers in the United States and Canada, together with shipments overseas, totaled 90,030, compared with 226,681 in July a year ago, according to an announcement released by the corporation. Sales in June were 101,908. Sales for the first seven months of 1938 totaled 703,983, compared with 1,324,051 for the same seven months of 1937.

Sales of General Motors cars to consumers in the United States totaled 78,758 in July, compared with 163,818 in July a year ago. Sales in June were 76,071. Sales for the first seven months of 1938 totaled 576,878, compared with 1,035,044 for the same seven months of 1937.

Sales of General Motors cars to dealers in the United States totaled 61,826 in July, compared with 187,869 in July a year ago. Sales in June were 72,596. Sales for the first seven months of 1938 totaled 481,474, compared with 1,067.057 for the same seven months of 1937.

Open House at Pratt & Whitney

The Keller sales department of Pratt & Whitney Corp., Hartford, Conn., has announced open house to be held between Aug. 15 and 19 for the public inspection of the Keller machine which will shortly be shipped to the Detroit territory.

The machine weighs approximately 155,000 lb. with its fixture and has a cutting range of 12 ft. by 6 ft. It was designed for the production of dies for the largest automotive stampings. Other machines will also be available for inspection and demonstration.

George Turnbull

George Turnbull, 54, chief engineer of the Chrysler Corp. of Canada, died Aug. 5, after a two months' illness. Born in St. Thomas, he went to Windsor 20 years ago.

Glass Plant Picketed

Libbey-Owens-Ford Glass Company at Ottawa, Ill., has been closed partially by picketing by Federation of Flat Glass Workers members attempting a "purge" of the plant. Attempts to organize a rival union to the CIO affiliate is said to have started the trouble.

John D. Biggers, president, has conferred with John L. Lewis in regard to the matter and is hopeful that the union will live up to its contract and resume work.

Casting of plate glass has not ceased at the plant. It would require about six weeks to resume operations if a complete shutdown were brought about, plant officials said.

Picketing started without notice to the management.

Ball joint and screw machine products, made by the J. J. Tourek Mfg. Co., Chicago, are described in the company's new catalog, No. 38-B.*

Proceedings of the twenty-fourth annual **road school** held at Purdue University have been compiled and edited by Ben H. Petty and issued in pamphlet form by the University's engineering extension department, Lafayette, Ind.

Rules and regulations governing the maximum hours of drivers of motor vehicles operated by common and contract carriers are described in the pamphlet "Hours of Service Regulations" obtainable at five cents per copy from the Superintendent of Documents, Washington, D. C.

The Elwell-Parker Electric Co., Cleveland, has issued a bulletin describing its type E-1 **high-lift platform truck.***

New information on filing and sawing speeds with **Contour machining** is given in

an illustrated folder recently prepared by Continental Machine Specialties, Inc., Minneapolis, Minn.*

Skilsaw, Inc., Chicago, manufacturers of **portable electric tools,** has issued a new catalog.*

A guide to the **specification of grey iron castings** appears in the International Nickel Co.'s pamphlet "Nickel Cast Iron Data," section 1, number 1.*

The Holo-Krome Screw Corp. has issued a new catalog, containing 40 pages of data, tables, standard and applications of value to users of **socket head cap screws, hollow set screws, socket hed stripper bolts and hollow pipe plugs.***

The Norton Co. has released a new catalog on its Type D **roll grinding machines,** 20 in. swing and larger of the work traversing type. This company has also published a catalog covering its 12, 14 and 16 in. **hydraulic universal grinding machines.***

The Truscon **Flor-Dye system** is described in a folder issued by the Truscon Laboratories, Detroit, Mich.*

The National Wheel & Rim Ass'n has published a new four-page folder on **special single and dual wheel equipment for trucks** in the ½, ¾ and 1-ton class, permitting the use of various tire sizes and combinations from the 16-in. heavy duty up to 20-in. duals on certain vehicles.*

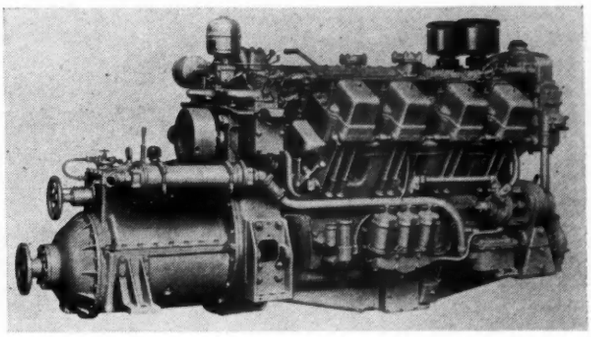
The Aluminum Co. of America has issued a revised edition of its booklet **"Welding Aluminum."***

Ground shafting is described in a folder brought out by Bliss & Laughlin, Inc., Harvey, Ill.*

"World Chemical Development in 1937" is the title of publication No. 177 in the Trade Promotion Series issued by the Bureau of Foreign and Domestic Commerce. Copies are available at 25 cents each from the Bureau of the Superintendent of Documents, Washington, D. C.

* Obtainable from editorial department, AUTOMOTIVE INDUSTRIES. Address Chestnut and 56th Sts., Philadelphia.

MARINE DIESEL



This new marine Diesel engine has been announced by the Caterpillar Tractor Co. It is a V-8 of 135 h.p., bore of 5¾ in., stroke of 8 in. Its maximum horsepower is developed at 900 r.p.m. Both fuel and injection pumps are factory set and require no adjustment.

Racing Abroad

French and German Grand Prix Races Won by Mercedes Cars

It did not take the engineering staff of the Daimler-Benz Company very long to eliminate the "teething" troubles of its 1938-formula racing cars, which caused them to drop out in the first of the international races of the season, and the firm has won both the Grand Prix de France and the Grosser Preis von Deutschland. In fact, at the present writing it seems as though Mercedes would have no serious competition during the rest of the season.

The French Grand Prix race was held on a curcuit at Rheims on Sunday, July 3. Two super-streamlined Auto-Unions had been eliminated through crashes in practice and there were only nine starters, viz., three Mercedes (Caracciola, Lang von Brautchitsch), two Auto-Unions (Kautz and Hasse), two French Darracqs (Etancelin and Carriere), a French Bugatti (Winille) and a French Sefac (Chabaud). Both the record for the course and the lap record for the circuit, of 97.99 and 101.9 m.p.h., were shattered by the German contenders during practice, the Auto-Unions seeming to be even faster than the Mercedes on the straight sections of the course. Hasse, in one of the new Auto-Unions, turned over during a practice spin, and the same lot befell Müller driving the other of the two new models, who had to go to the hospital. This left only the two conventional Auto-Unions in the race. The race was won by M. von Brautchitsch, who covered the 318 miles in 3 hrs. 4 mins. 38.5 secs., or at the rate of 101.3 m.p.h., which bettered the previous record for the course. Second was Rudolph Caracciola, in 3 hrs. 6 mins. 19.3 secs., and third Hermann Lang, one lap behind the leader. All three drove Mercedes 183-cu. in. supercharged cars. The only other car to finish was the Darracq driven by Réné Carriere, who was ten laps behind the winner. The Darracq car has a non-supercharged engine of 274.5 cu. in. displacement.

The Grand Prize race of Germany was held on the Nürburg Ring on Sunday, July 24, before a crowd estimated at 350,000. Five Mercedes started in the race, four Auto-Unions, five Alfa-Romeos, five Maseratis and two Delahayes. Von Brautchitsch, who had won the French Grand Prix, first had a fire, due to a backfire when starting up after refuelling, and after this had been put out by the pit crew and he had gotten off again, he did not get far before he crashed. The race was won by Dick Seaman, an English race driver, driving one of the Mercedes cars, at an average speed of 80.6 m.p.h. Second to get the checkered flag was another Mercedes which had been driven by Caracciola at the start but was turned over to H. Lang in the course of the race because Caracciola fell ill. The average speed of the runner-up was 79.5 m.p.h. Only two other cars finished, both Auto-Unions, driven by H. Stuck and Tovio Nuvolari and H. Müller (Müller at the start, Nuvolari for the greater part of the race), their respective mean speeds being 77.7 and 77.4 m.p.h. When the race was called off, four cars were still running, namely, the Delahaye driven by Dreyfus, which completed 21 laps; the Maserati driven by

(*Turn to page* 192, *please*)

MEN OF THE INDUSTRY

J. W. HERMAN has been elected treasurer of the Lukens Stele Co., Coatesville, Pa.

KARL YOST, engineer in charge of the Truck and Bus Brake division of the Bendix Products Corp., has joined the staff of the Warner Electric Brake Mfg. Co., Beloit, Wis. This column previously reported incorrectly that Mr. Yost had joined the staff of the Wagner Electric Brake Mfg. Co.

DR. VICTOR G. HEISER, former director of health of the Philippine Islands and author of "An American Doctor's Odyssey," has been appointed as research director of the National Association of Manufacturers' committee on healthful working conditions.

E. B. ARNSBARGER, vice-president and vice-president of sales of the Clydesdale Motor Truck Co., has resigned from his active duties. He remains on the board of directors. **AMOS F. WHITE** will continue as export manager and vice-president of sales until further notice.

The Weaver Manufacturing Co. announces that **M. D. RICE** and **C. H. PHELPS** have recently joined Weaver and assumed duties in the sales promotion and engineering departments respectively.

W. A. DANNER is to be district manager of the new Minneapolis district sales office to be opened Sept. 1 by the American Rolling Mill Co. He will be assisted by **S. A. YAGER.**

HARRY C. CRAWFORD, for the past 18 years business manager and comptroller of Thompson Products, Inc., has joined the International Piston Ring Co. of Cleveland in the capacity of sales manager in charge of all domestic territory.

GUY D. BARNETT, formerly head of the body-design department of the Chrysler Corp., has been appointed to the post of Dodge body engineer.

BUSINESS IN BRIEF

Written by the Guaranty Trust Co., New York

General business activity continued to gain last week, and optimism became more widespread. The index compiled by the Journal of Commerce reached a new high for this year during the week ended July 30. The figure stood at 73.9, as compared with 72.2 the week before and 101.7 a year ago. Car loadings declined contrary to the usual seasonal movement, but automotive activity and electric output showed sharp gains.

Railway freight loadings during the week ended July 30 amounted to 588,703 cars, which marks a gain of 7821 cars above those in the preceding week, a decline of 190,388 cars below those a year ago, and a reduction of 158,826 cars below those two years ago.

Production of electricity by the electric light and power industry in the United States during the week ended July 30 was 7.2 per cent below that in the corresponding period last year.

Production of lumber during the week ended July 23 stood at 60 per cent of the 1929 weekly average. Production and shipments were at relatively high levels, and new orders were at the highest figure for any week in the last fifteen months.

Average daily crude oil production for the week ended July 30 amounted to 3,316,400 barrels, as compared with 3,349,050 barrels for the preceding week and 3,591,900 barrels for the corresponding period last year.

Steel operations last week rose three points to 40 per cent of capacity, which is the highest rate reached in nine months. Most of the automobile manufacturers are expected to enter the market for steel by the middle of this month.

Professor Fisher's index of wholesale commodity prices for the week ended August 6 stood at 81.0, as compared with 81.6 the week before and 81.5 two weeks before.

The consolidated statement of the Federal Reserve banks for the week ended August 3 showed a decline of $1,000,000 in holdings of discounted bills. Bills bought in the open market and Government securities remained unchanged. Money in circulation increased $49,000,000, and the monetary gold stock rose $23,000,000.

Production

(*Continued from page* 183)

Immediate prospect for present tone of car production hinges chiefly on the two major producers—Chevrolet and Ford. Expectation is that Chevrolet will close its 1938 program probably on August 18, but with Ford opening an interval of 1938 production on August 15, the likelihood is that the week of August 20 will close with the strongest schedule since July 23.

Total factory sales of passenger cars and trucks in the United States and Canada for July were estimated at 148,200 units by the Automobile Manufacturers' Association, in a report issued this week. This brings the total for the first seven months of 1938 to 1,454,200 units. Compared with the first half last year, retail sales were 51 per cent lower, while factory sales to the domestic market declined almost 60 per cent.

Statistically, the business picture is overwhelmingly optimistic, considering July reports from authoritative quarters. At week end, Chevrolet reported that new car and truck sales in July had reached 51,047 units, exceeding June totals by 11.19 per cent. W. E. Holler, general sales manager, announced the greatest used car stock reduction ever achieved by Chevrolet dealers in a single month, recording grand total sales of 135,558 units, total net used car reduction of 28,185 units.

Ford Motor Co. reported a sharp increase in retail sales of Ford V-8 cars and trucks in July. Showing surprising contra-seasonal trend, total sales of cars, commercial cars, and trucks were up 12 per cent over June, in the face of a four-year trend averaging July sales 7.25 per cent under June. Truck sales, showing the largest gain, were up 42.5 per cent, commercial cars up 17 per cent. Total sales of all Ford V-8 units for July were 44,905, compared with 40,099 units in June. Truck sales totaled 6235 units, compared with 4353 in June, commercial car sales 5273 units against 4486 in June of this year.

Unexpected strength in summer retail trade was noted by Don E. Ahrens, Cadillac-LaSalle general sales manager. Customer deliveries in July fell only five per cent short of June, whereas in the similar period of preceding years the drop has been as much as 38 per cent. Used car stocks in Cadillac establishments continue to decrease. Since January 1 dealers have reduced used car inventories by $1,000,000, Mr. Ahrens said.

Figures released by W. F. Hufstader, Buick general sales manager, indicate that July retail deliveries totaled 12,254 units, representing less than a seasonal decline under June. Actual figures show July retail sales only 8.2 per cent under June total of 13,463 units. The month wound up with a substantial increase in used car deliveries, 11,500 cars being sold in the last ten days, compared with 9900 in the previous period. Buick dealers sold 29,799 used cars during July, compared with 29,814 in June. —J. G.

Books

of automotive interest

Deutsche Kraftfahrtforschung, im Auftrage des Vekehrsministeriums, Hefte 4 bis 8. (German Automotive Research, to the order of the Department of Transport, Nos. 4 to 8.)

No. 4 of the research bulletins contains three reports, as follows: Fresh-oil Lubrication of Plain Connecting-Rod Bearings, by L. Huber and J. Eiberger; Investigations on Automotive Diesel Engines by P. Riekert and H. Ernst, and Investigations on Radiation from the Combustion Chambers of Diesel and Otto Engines with a Photocell Sensitive to Infrared Rays, by L. Bisang.

In stock engines the connecting-rod bearings are lubricated by circulating oil. The experiments made by Huber and Eiberger were intended to clear up the applicability of lubrication by fresh oil. Among the factors investigated were the relation between the minimum safe rate of

L. CLIFFORD GOAD

. . . whose appointment as general manager of the AC Spark Plug division of General Motors has been announced.

One of the youngest general managers in the ranks of General Motors, being only 37, Mr. Goad succeeds Fred S. Kimmerling, who has been on leave of absence since last September because of ill health. Mr. Goad has been acting general manager during Mr. Kimmerling's absence.

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oil supply and the bearing load and the influence of artificial cooling of the bearing on the necessary oil consumption. The object of the research project covered in the report by Riekert and Ernst was to clear up the technical problems connected with the development of automotive Diesel engines. In the course of the investigation a number of new instruments were devised and instruments already available were developed further. The tests showed specific outputs of up to 0.22 hp. per cu. in. displacement, b.m.e.ps up to 100 lb. per sq. in., and specific fuel consumptions down to between 0.42 and 0.44 lb. per hp.-hr., which made the brake thermal efficiency equal to 33 per cent. Bisang made investigations on high-speed Diesel and Otto engines with a new photo-cell indicator based on the radiation principle. Among the factors investigated were the relation between the radiation on the one hand and speed and load of the engine on the other, as well as the choice of the injection and ignition points. In the case of the Otto engine the influences of supercharging and of the mixture proportion were investigated.

(*Turn to page* 194, *please*)

Automotive Metal Markets

Scramble for Automotive Steel Orders Expected as Aftermath of Basing Point Upheaval

Chiefly as the result of widely scattered, small lot orders from parts makers, steel finishing mills are able to round out the period of waiting for tonnage business from automobile manufacturers in relatively good shape. Estimates of rolling mill activities in the different steel-making districts denote mostly small gains, so that the American Iron & Steel Institute's report of employed ingot capacity, given at 39.4 per cent for this week as compared with 39.8 per cent in the preceding week, is not interpreted as a set-back, but rather as an indication that the gains made last month, which denoted an improvement of 21 per cent over the June record, are being maintained. Behind the scenes there is much jockeying for position on the part of steel producers. Some of these see in the basing point upheaval the coming of a new deal in the distribution of steel orders, and never before have there been so many stratagems employed to outwit competitors. There were rumors this week of the withdrawal of offers of cold rolled sheets at concessions, coupled with assurances that these offers had been only an empty gesture and that no business had been booked at below the regular market prices. It is only natural that a good deal of the business that is expected to be placed by automotive consumers in the next six weeks is earmarked and will go to mills that in the past have served these buyers satisfactorily. More than the usually spirited scramble is expected to develop, however, for much of the business that overhangs the market. Reports that one of the smaller steel producers had been successful in negotiating a wage cut with union workers were later denied, having resulted apparently from a misunderstanding. Certain piece workers have a sliding wage scale, which is periodically adjusted to the quoted market price of pig iron. The latter declined $4 per ton between June and August, and puddlers and finishers, who work under an Amalgamated Association of Iron, Steel and Tin Workers' agreement, had their pay adjusted on the lower basis. Significant is the modified attitude of many of the steel producers, who now emphasize that, if it is possible to lift steel consumption, so that a 60 per cent operating rate can be attained, it may be possible for them to operate without having to resort to wage cuts.

Non-ferrous metals got off to a tame start this week. Spot Straits tin was offered at 43½ cents, a fraction off the preceding close. On Tuesday the market was barely steady at 43⅜ cents. R. G. Mills, a London financier without any connection with the tin market, has been appointed manager of the Buffer Pool. The slow improvement in tin consumption in the United States is giving the International Tin Committee fresh headaches. Ordinarily, a lowering of the price of sterling in terms of dollars, such as has taken place in the last few days, would send tin prices higher, but the dislocation of sterling values only served to add to the market's dullness.

Copper prices were fairly steady, spot electrolytic continuing to be quoted at 10⅛ cents. The export price held at around 10⅜ cents, latest reports being to the effect that Germany and Russia continue to buy considerable metal for armament.

Secondary aluminum specialists in the Detroit district have advanced their prices for most alloys another quarter of a cent. Foreign metal papers point out that competition between magnesium and aluminum is growing keener, and ascribe part of recent price movements to this and to keener competition among European aluminum producers in spite of cartel agreements.—W. C. H.

Highway 'Phone System for German Motorists

Arrangements have now been completed in Germany whereby persons traveling on the motor roads of that country may be contacted by telephone, according to the Transportation Division, Bureau of Foreign and Domestic Commerce.

The telephone calls will be accepted at the usual rates and may be directed to any one of 37 gasoline filling stations located on 1250 miles of motor roads in Germany.

It is necessary that the person who desires to originate the telephone contact make application for such service at least one-half hour in advance.

Racing Abroad

(*Continued from page* 189)

Pietsch, 20 laps; the Alfa-Romeo driven by Ghersi, 20 laps, and the Maserati driven by Cortese, 19 laps. The race comprised a total of 22 laps and the course has been described as a continuous series of laps and bends.

At a dinner which followed the race, Seaman was presented with the "Preis des Führers" by Korpsführer Hühnlein, the official head of the automobile movement in Germany.

A few details of the new Auto-Union racers built in accordance with the 1938 racing "formula" have come to hand. Where the older Auto-Unions had 16-cylinder V engines, the new ones have 12-cylinder engines of the same type, with an angle of 60 degrees between cylinder banks. The valves are arranged in the cylinder head at an angle, as is common in racing engines, and are actuated through three camshafts, a single central camshaft actuating the inlet valves of both banks, while the exhaust valves of each bank are actuated by a separate camshaft located to the side of the engine (overhead as regards the particular cylinder bank). The 183-cu. in. engine is formed in a single block with the transmission and the final-drive housing. It is located behind the driver and is provided with a single blower which draws mixture from the carburetor. A five-speed transmission is used, and the driving axle, while still independently sprung, is now of the double-link instead of the oscillating type. Owing to the smaller length of the engine, the car has a shorter wheelbase than the older Auto-Union racer.

Annual A.S.T.E. Meeting Scheduled for October

The annual meeting of the American Society of Tool Engineers, to be held at Pittsburgh, Oct. 14-15, is designed and intended to provide an opportunity for members to see modern steel plants in operation and to view the production of other major industrial items, according to a statement made by Ford Lamb, executive secretary of the society.

DeSoto Anniversary

Organized in 1928 as the DeSoto Motor Corp., a division of the parent Chrysler Corp., DeSoto this month begins its second decade in the automotive field. The corporation is reported to have almost 3000 dealers at the present time in this country.

TOOLS OF TOMORROW

Dressing Tool

. . . Device developed for spot welding tips

Metallurgical Products Co. recently developed a dressing tool for spot welding tips. The device consists of a 9-in. chrome plated rachet handle and a double-sided cutting tool with ground teeth. Construction is simple, the only other parts being a ratchet key with compression spring and a cover plate attached by two screws.

This tool is said to offer the welder speed and convenience in the dressing operation. It removes the mushroom with economy of metal and dresses tips uniformly.

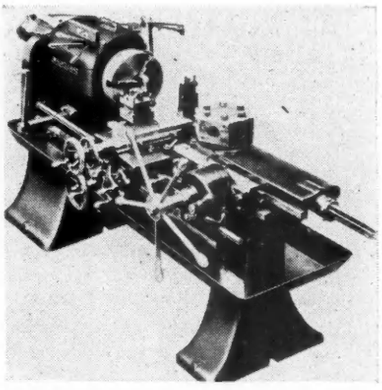
Threading

. . . New Landis machine for cutting threads simultaneously on both ends of tie rods, short bars, etc.

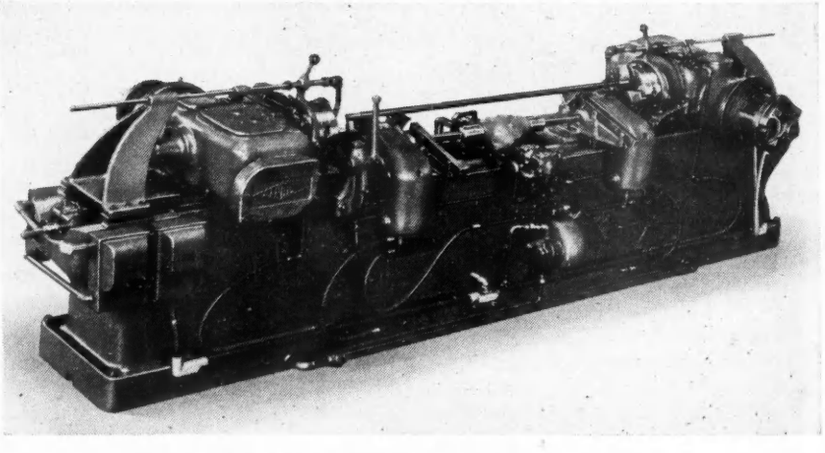
Cutting of threads simultaneously on both ends of tie rods, short bars, etc., can be accomplished on a new machine developed by the Landis Machine Co., Waynesboro, Pa. Mechanical features of the unit, which is called the Lanhydro double-end threading machine, are as follows:

Cutting speed of each threading unit is independently controlled by pick-off type gear boxes, thus making available a wide variation in spindle speeds. The machine covers a wide diametrical range of sizes from ½ in. to 2 in., inclusive. Minimum and maximum length of bars which can be handled on the machine illustrated herewith are 4 ft. 2 in. to 6 ft. 6½ in., but the maximum length can easily be increased to 10 ft. if desired.

The maximum travel of the threading head units is 22 in., and a corresponding thread length is obtainable when maximum length bars are being handled. Positions of threading head units, gripper jaws, and ejector are easily changed for rods of various lengths.



New Universal turret lathe, the No. 4, announced by the Millholland Sales and Machine Co., Indianapolis, Ind. Some of the principal specifications are as follows: Automatic chuck capacity, round, 1¾ in., hexagon, 1½ in., and square, 1¼ in.; number of spindle speeds, 12 (24 to 600 r.p.m. or 40 to 1000 r.p.m.); swing, over ways, 18 in., over carriage guides, 17 in., over carriage cross slide 9½ in.; carriage, cross travel, 9 in., longitudinal feeds, 12 (0.0055 in. to 0.104 in.), cross feeds, 12, (0.003 in. to 0.082 in.); maximum distance from end of spindle to face of turret, 20 in., turret feeds, 12, (0.0055 in. to 0.104 in.)



Landis "Lanhydro" double-end threading machine

Chevrolet Buffalo Plant

Indications are that production in the new Chevrolet motor and axle plant in Buffalo, N. Y., will be approximately doubled from its former rate when work gets way on the 1939 models, according to Alfred G. Gulliver, plant manager.

The plant is now closed temporarily. Work on 1938 models was halted a week ago. Operations are expected to resume "around Sept. 12." If the current improvement in the automobile situation continues, Mr. Gulliver said, operations may be stepped up to around 300 motors and 300 axles a day. A rate of 150 a day had been maintained since the opening of the plant this spring.

Borg-Warner Financial Report

Report of the Borg-Warner Corp. and subsidiaries for the six months ended June 30, 1938, revealed a net loss of $633,603.75 as compared to a net income (before provision for Federal undistributed profits tax) of $4,304,299.40 for the six months ended June 30, 1937.

Letters

to AUTOMOTIVE INDUSTRIES

Editor, AUTOMOTIVE INDUSTRIES:

The very valuable survey conducted and reported by Thomas G. MacGowan of Facts, Inc., in the recent issues of AUTOMOTIVE INDUSTRIES should convince everybody that a demand exists for cars which will afford the driver full and safe visibility. Car owners have apparently come to realize that they have been bilked by the stylists who have sacrificed visibility year after year to produce sleek examples of reversed streamlining.

After one examines the styling situation, he should not be surprised to find that visibility occupies second place in the list of answers to the question asking for the most needed improvement in the current automobiles. If more people stopped and considered how they have been visually handicapped I dare say this improvement would take first place on that list, overcoming "gasoline economy" in spite of the present universal tendency to mind the pennies.

And to objections that were raised in Mr. MacGowan's survey to cars with the engine in the rear, it might be well to recall the maxim that "self preservation is the first law of nature." As Mr. W. J. Cameron, managing director of the National Safety Council, has so well said: "The most startling change to be expected in automobile construction is the moving of the engine to the rear in order to place the driver's seat at the very front. Engineers say this move is not only a natural development in streamlining but a major step in eliminating the false security the driver feels when he sits, as now, behind five or six feet of hood. At the front of the car, where he could see the road flash beneath him, there would be a greater awareness of speed and its danger if not regulated to traffic conditions."

ARTHUR W. STEVENS.

AUTOMOTIVE ABSTRACTS

Mawen Engine

From a paper on rotary-valve internal-combustion engines presented at the seventy-sixth annual meeting of the Verein Deutscher Ingenieure by Dipl.-Ing. Riedel it appears that the Mawen engine described in AUTOMOTIVE INDUSTRIES of May 21 last, is being built under Sklenar patents, and that engines are being developed under these patents also by Gebr. Sachsenberg A.G. of Dessau, and Graf & Stift of Vienna.

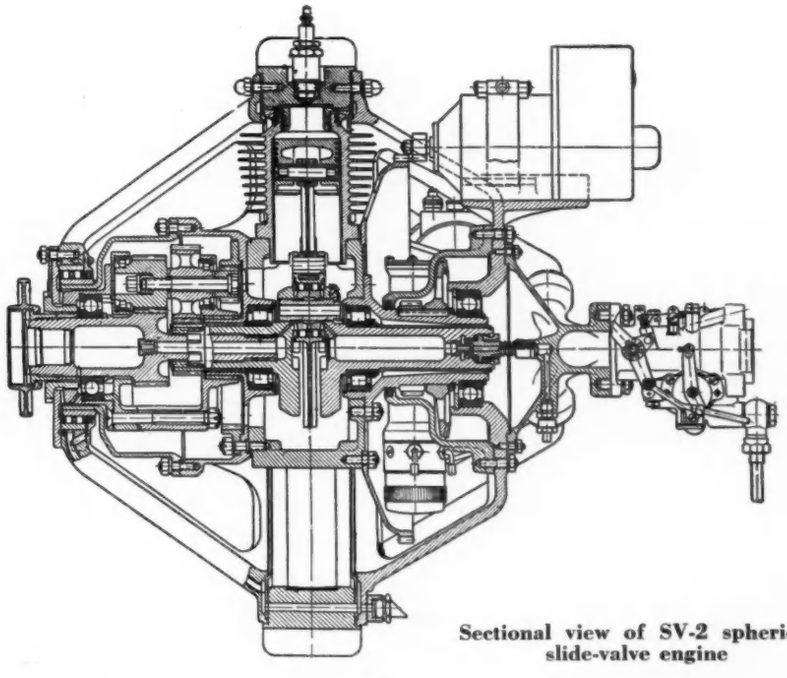
The external stationary member of this engine is turned out spherically on its inner surface. Each cylinder of the radial engine is provided with a bushing which has its outer end finished spherically and bears against the spherical surface of the stationary member. In service the bushings are said to rotate slowly around their axes, thus grinding themselves in to a perfect seat on the stationary member. It is claimed that if carbon or metal particles should accidentally get onto the valve surface, they are automatically removed by this rotary motion. Between the individual cylinder bushings there are additional packing means, so-called packing shoes, which serve the purpose of packing the ports against the atmosphere after the cylinder bushings have passed over them.

The design developed by Gebr. Sachsenberg A.G., which may be regarded as an experimental model of an aircraft engine, is illustrated in Fig. 1. It is a redial, four-stroke engine of 91.5 cu. in. displacement, and is provided with a reduction gear giving a reduction of 2:1 between the crankshaft and the propeller shaft. All of the parts required for this reduction gear are made use of in rotating the engine block at one-seventh the speed of the crankshaft, in the opposite direction.

Side thrust of the pistons is taken by the cylinder block, and the torque on the cylinder block, therefore, is equal to that on the crankshaft. Thus 14.3 per cent of the total power absorbed by the propeller comes from the cylinder block and the remainder from the crankshaft. The spark plugs are secured into the stationary member.

Since both the fresh charge and the spent gases pass through the packing bushings, the temperature of the latter never becomes excessive. In the case of the SV-2 model, the maximum port opening is equal to 27-35 per cent of the piston-head area. This engine, with a compression ratio of 6.3, developed 60 hp. at 4480 r.p.m. with a specific fuel consumption of 0.44 lb. per hp-hr. In the SV-2 engine the rubbing veloc-

(*Turn to next page, please*)



Sectional view of SV-2 spherical slide-valve engine

Books

(*Continued from page* 191)

No. 5 contains a report by F. Kneule entitled "Contribution to the Investigation of the Combustion Process in High-Speed Diesel Engines." No. 6 deals with "Transverse Fractures in Propeller Shafts and Elimination of Their Causes," by A. Thum. No. 7 contains two reports on Diesel fuel subjects, viz., "Selective Solvents for the Production of Diesel Fuels from Low-Temperature Lignite Tars" by R. Heinze, M. Marder and H. Welz; and "Determination of the Ignition Quality of Diesel Fuels" by R. Heinze and M. Marder. No. 8 contains a report on "The Transmission of Signals to Vehicles to be Overtaken," by U. Schmidt and W. Baudach.

These reports, which are printed in German, are published by VDI Verlag, G.m.b.H., Berlin. They are bound in paper covers and sell at 5, 2, 1, 2.25 and 0.75 marks respectively.

The Elements of Ferrous Metallurgy, by Joseph L. Rosenholtz, Ph.D., and Joseph F. Oesterle, Ph.D. Second edition. Published by John Wiley & Sons, Inc., New York. $3.00.

The science of metallurgy has expanded greatly during the past several decades, and even ferrous metallurgy is such a broad subject that it cannot be dealt with comprehensively in a single volume. Most books on metallurgical subjects therefore are written from the standpoint of a particular class of readers or students. The book here under review is intended as a textbook on metallurgy for engineering students taking courses other than in metallurgy and as an introduction to the study of metallurgy. It deals with the subject in a broad but concise way and should make an excellent textbook for those needing a general knowledge of ferrous metallurgy. The following chapter heads will give a good idea of the field covered: Fundamentals, The Blast Furnace, The Bessemer Process, The Open-Hearth Process, The Electric Process, Wrought Iron, The Cementation and Crucible Processes, Ingots, The Iron-Carbon System, The Mechanical Treatment of Steel, The Heat Treatment of Carbon Steels, The Elements in Carbon Steels, The Analyses and Uses of Carbon Steels, Alloy Steels, Cast Irons, The Foundry. The book is well illustrated with photographs and drawings, most of the latter being of a diagrammatic nature.

The Principles of Motor Fuel Preparation and Application, by Alfred W. Nash, Professor of Petroleum Technology at the University of Birmingham, and Donald A. Howes, D. Sc. Vol. 1. Second edition. Published by John Wiley & Sons, Inc., New York. $9.30.

When the two-volume work on Motor Fuels by Nash and Howes appeared some years ago, it drew a good deal of favorable comment as one of the most comprehensive and authoritative works on petroleum products ever published, and the fact that a new edition of the first volume should have been called for within a space of four years is evidence that the work has found favor among petroleum technologists and others interested in motor fuels. The work covers the subject from both the theoretical and the practical viewpoints. During the four years which have passed since the appearance of the first edition, considerable development has taken place in the motor-fuels industry, and these developments have been taken care of in the various chapters. The greatest development during this period undoubtedly has been in pyrolysis and polymerization processes for the production of superior grades of motor fuel from natural gas and the gaseous by-products of the cracking process, and a separate chapter is devoted to these processes. That this comparatively new subject is given all the consideration it deserves may be judged from the fact that the chapter devoted to it contains more than 50 pages, and the bibliography appended to it contains 110 references. The work deals also with all of the other of the newer motor fuels that may take, and to some extent have taken, the place of petroleum distillates, including benzol, alcohol and synthetic fuels. We have no doubt that the new edition will meet the same favorable reception as its predecessor on the part of the motor-fuels and motor industries.

Calendar of Coming Events

CONVENTIONS AND MEETINGS

National Petroleum Association Meeting, Atlantic City, N. J.....Sept. 14-16
Seventh International Management Congress, Washington .....Sept. 19-23
SAE National Truck, Bus & Railcar Meeting, Chicago .....Oct. 4-5
American Society of Mechanical Engineers Meeting, Providence.....Oct. 5-7
SAE National Regional Fuel and Lubricants Meeting, Tulsa, Okla..Oct. 6-7
SAE National Aircraft Production Meeting, Los Angeles, Calif...Oct. 13-15
A.S.T.E. Annual Meeting, Pittsburgh, Oct. 14-15
American Welding Society Meeting, Detroit .....Oct. 17-21
SAE Annual Dinner, New York....Nov. 14
SAE National Transportation Engineering Meeting, New York....Nov. 14-16
National Safety Council Meeting, Chicago .....Nov. 14-18
American Petroleum Institute Meeting, Chicago .....Nov. 14-18
National Industrial Traffic League Meeting, New York .....Nov. 17-18
Automotive Service Industries Show, Chicago .....Dec. 5-10
*National Standard Parts Association Meeting, Chicago .....Dec. 2-3
SAE Annual Meeting, Detroit.....Jan. 9-13

SHOWS

20th Annual National Metal Exposition, Detroit .....Oct. 17-21
New York, National Motor Truck Show, Nov. 11-17
New York, National Automobile Show, Nov. 11-18
Pittsburgh, Pa., Automobile Show, Nov. 11-18
Detroit, Mich., Automobile Show, Nov. 11-19
Columbus, Ohio, Automobile Show, Nov. 12-18
Buffalo, N. Y., Automobile Show..Nov. 12-19
Chicago, Ill., Automobile Show..Nov. 12-19
Milwaukee, Wis., Automobile Show, Nov. 12-19
Minneapolis, Minn., Automobile Show, Nov. 12-19
*Philadelphia, Pa., Automobile Show, Nov. 12-19
*San Francisco, Calif., Automobile Show .....Nov. 12-19
Boston, Mass., Automobile Show, Nov. 12-19
Los Angeles, Calif., Automobile Show, Nov. 12-20
*St. Louis, Mo., Automobile Show, Nov. 12-20
*Elmira, N. Y., Automobile Show, Nov. 14-19
New Haven, Conn., Automobile Show, Nov. 14-19
Indianapolis, Ind., Automobile Show, Nov. 19-25
Baltimore, Md., Automobile Show, Nov. 19-26
Rochester, N. Y., Automobile Show, Nov. 19-26
Montreal, Canada, Automobile Show, Nov. 19-26
*Washington, D. C., Automobile Show, Nov. 19-26
*Cincinnati, Ohio, Automobile Show, Nov. 20-26
Newark, N. J., Automobile Show, Nov. 26-Dec .3
Denver, Colo., Automobile Show, Dec. 5-10

*Tentative

Mawen Engine

(*Continued from page* 193)

ity on the spherical surface is 26 per cent greater than the mean piston speed, while in a later design it is only 17 per cent greater.

In contrast to other types of rotary valve engine, in the "spherical slide-valve type" the bushings are pressed against their seatings at first only by centrifugal force. The additional force of application due to the combustion pressure can be neutralized by suitable design. However, a certain increase in the pressure of the bushing against the ring with the pressure within the cylinder is necessary, and in Model SV-2 at full load the bushings are pressed

against their seatings with a pressure of 8.5 lb. per sq. in. by the centrifugal force and 42.5 lb. per sq. in. by the gas pressure.

The sectional view of the SV-2 engine herewith is reproduced from *Automobiltechnische Zeitschrift.*

New Sources of Rubber

Whereas in the hevea rubber plant the latex is contained in cells which communicate with each other lengthwise of the stem, and its physiological role seems to be to heal any cuts which the bark may suffer, the cells of the guayule, another species of rubber plant, do not communicate with each other, and the latex therefore does not flow of itself if the bark is cut. On the other hand, this latex contains resinous substances for the nutrition of the plant, and its concentration is very high. These conditions determine the method of extracting latex from the guayule plant.

This plant has been acclimated in California for some years, and in 1931 an extraction plant was placed in operation in Salinas. At the end of four years the guayule shrub contains enough latex to make extraction profitable. The plants are cut with machines, dried and cut to lengths of ⅜ in. The material is then cleaned and pulverized in tubular grinding machines in the presence of water, the object of the latter being to impregnate the ligneous fibers, while the rubber particles coagulate in globules. The pulp is then subjected to a series of treatments with the object of separating the constituents, to eliminate the resins, and to obtain a rubber which is as dry and pure as possible. Finally the substance is compressed in blocks which are packed in boxes of accurate dimensions.

Automobile tires were made from guayule rubber in the United States for the first time in 1934. That country therefore possesses a source of rubber which could replace the imported hevea rubber in case of an emergency. The dangers which accompany this dependence on foreign sources of supply led Edison during the latter years of his life to search the vegetable kingdom for possible sources of rubber. The guayule seems to furnish a satisfactory solution of this problem, if it is admitted that during the few years necessary before the young plants will furnish rubber, the industry could get along with available reserve stocks. Under such conditions the question of cost of production is necessarily of secondary importance.

In the U. S. S. R. experiments have been carried on for more than a decade on more than 150 plants capable of yielding rubber. The most encouraging results seem to have been obtained with the chondrilla, a plant which grows in profusion in Turkestan and in Transcaucasia, and with the "kok-saghyz". At the present time the culture of the latter has been taken up on a large scale throughout southern Russia.—*Chimie et Industrie* for July.

Miller-Bellanca May Establish New Plane Factory

Definite decision as to establishment of a new airplane factory in Canada was to be made when directors of Miller-Bellanca Airplanes, Ltd., met in New York. T. William Smith, secretary-treasurer, and Theodore Beuaregard, vice-president, was to confer with Frank Bellanca, president, with regard to plans for construction of a plant at one of three sites now under consideration.

The Bellanca company plans to build high-speed bombers having a speed of over 300 m.p.h. A new twin-bodied bomber, powered by two 1000 hp. engines was designed by Bellanca last year. The machine will be equipped with engines designed by Harry A. Miller, maker of engines for racing cars and boats. Miller-Bellanca established an office in Montreal last March and directors of the company have spent the intervening time in a tour of inspection of suitable sites in Quebec and Ontario for a new plant.

Houghton Oils for Fifty Years

According to the current issue of The Houghton Line, the company has had the experience of supplying cutting oils for 50 years. This note served as an introductory to an announcement that Houghton has introduced a new line of soluble oils—the "60" Series. Top of the heap is Hocut "60," a transparent solution that, it is stated, will stand boiling without separation. Permasol "60" is lower priced, heavier bodied.

Commercial Credit Co. Report

Financial report of the Commercial Credit Co., Baltimore, Md., for the half year ended June 30 indicated a net income credited to surplus of $5,148,195.37. Net income credited to surplus for the six month period ended June 30, 1937, was reported as being $7,096,263.38.

Report on 1937-38 Motor-Gasoline Survey Issued

A report on the Cooperative Fuel Research motor-gasoline survey for 1937-38 has been published by the Bureau of Mines, Washington, D. C. It was compiled by E. C. Lane, assistant petroleum chemist of the Bureau, and is the fifth in a series of reports on properties of commercial motor fuels, made in accordance with a cooperative agreement between the Cooperative Fuel Research (R.C.F.) Committee and the Bureau of Mines of the Department of the Interior.

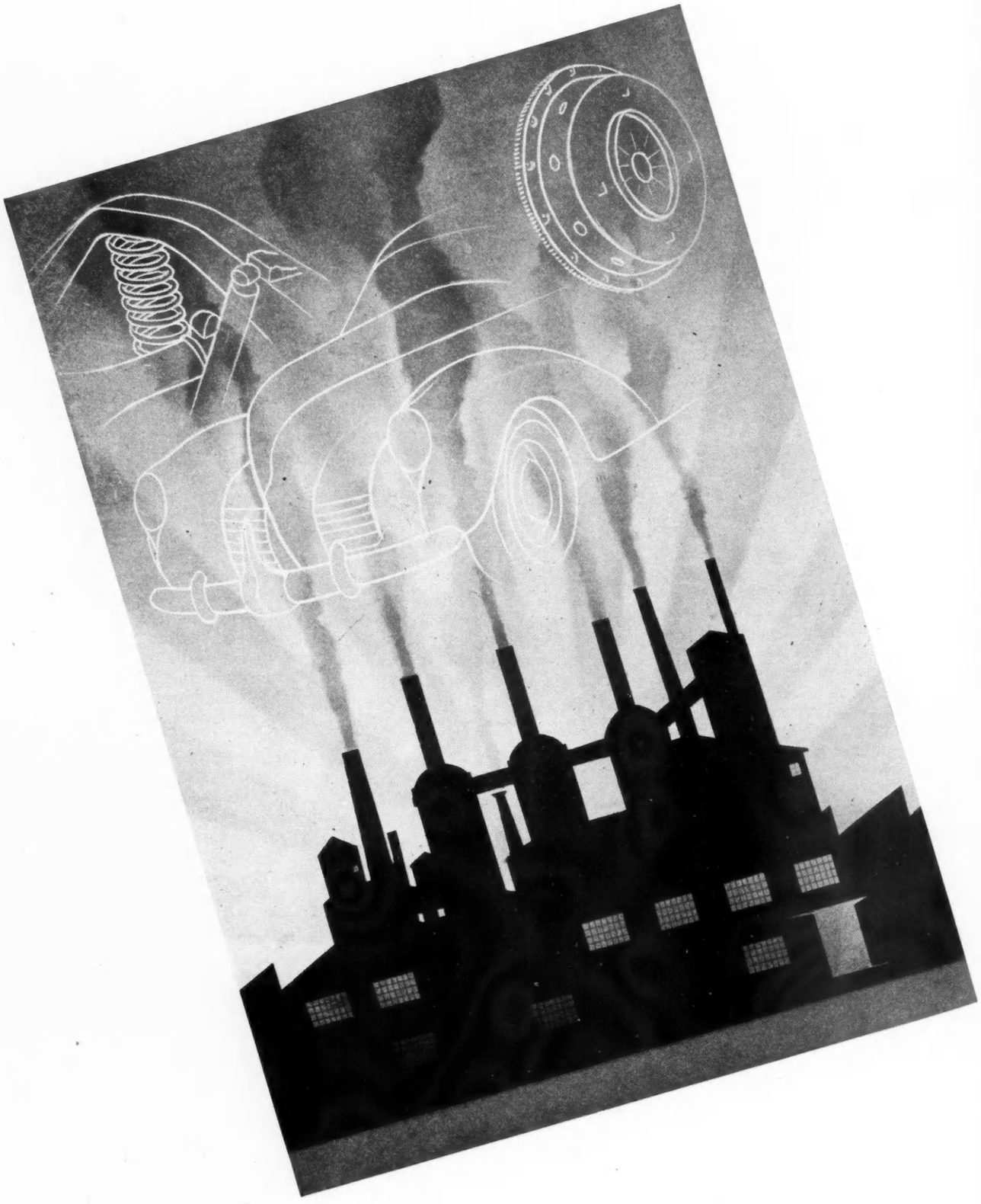
Characteristics of regular-price, premium-price, and third-grade motor gasolines are reported, based on inspections made in oil-company labcatories and submitted to the Bureau of Mines for compilation and comment.

The data in the current survey are different in some respects from the corresponding figures in the previous surveys, owing to the inclusion of a larger number of analyses and of reports from a greater distance surrounding the centers of the districts reported. In general, no definite tendencies in change of characteristics are evident.

One table in the survey gives data on gravity, sulfur content, Reid vapor pressure, copper-strip corrosion test, ASTM octane number, and distillation characteristics for commercial gasolines sold in 20 marketing areas in the United States during the winter of 1937-38. Average values are given in other tables.

The octane-number ratings of the regular-grade gasolines, as indicated by the range of 90 per cent of the samples, show an increase of a fraction of an octane number over the previous winter survey, while the octane number of premium-price gasolines remains substantially the same as reported in the previous winter survey.

A range of 8.6 to 12.2 is shown in the vapor pressures of 90 per cent of the regular-price gasolines. This is a narrower range than that shown last winter, although the two years show virtually the same range of distillation temperatures. The premium-price gasolines have a range of 7.8 to 11.8, which is only slightly greater than the value for the preceding year, with a narrower range of distillation temperatures. The third-grade gasolines show a range of 6.2 to 11.1 in vapor pressure, which is wider than that of the previous winter and is accompanied by a wider range of distillation temperatures.



New Conception of Styling

Will Mark 1939 Cars

Coming models represent more substantial changes than any offered in ten years. Bright colors dominate in body finishes. Remote gear shifts banish the "wobble stick."

By Joseph Geschelin

THE long heralded industry-wide shift in passenger car styling and mechanism design bears fruit in the cars that will be offered to the public for the '39 model year. The motor industry has moved almost in concert to an entirely fresh conception of styling and engineering, with new values for the consumer's dollar.

And yet the trend may be considered as being on the conservative side, at least from the standpoint of the table talk of recent years. What we mean is that many radical features have not yet arrived—"tear drop" streamlining, automatic transmission, rear engine cars, air-conditioning—these and similarly radical ideas still remain in the distant future. Nor do we expect the birth of any revolutionary small, low-priced car this season. What may come in 1940 is another story, for we gather that a number of manufactures are doing spade-work along this line.

What the range of Price will be, is a matter of conjecture at the moment. There is an undercurrent of thought intimating that prices may be somewhat lower. Be that as it may, the fact is that engineering departments in most plants are going over unit and detail designs with a fine-tooth comb in an effort to reduce cost by skillful engineering design, by substitution of materials, by studied changes in production technique. There is no question that the new product will offer much more value for the customer's dollar. It remains to be seen whether costs can be pared sufficiently to pass on some of the gain to the car buyer.

The new cars represent more engineering and more substantial changes than any product in perhaps ten years. We are certain that no one will be able to say that the new models are just retailored or dressed up. In the first place, the industry's stylists have finally hit on the modern theme. They have made a number of stabs in recent years. Here for example is the Lincoln-Zephyr with low body, beautiful sloping back, and a refreshing front end treatment reminiscent of a graceful speed boat. Then there is the Graham-Paige with an entirely new treatment of body lines and front end symbolic of speed even at the curb. Then again, we have the Cadillac "60" emphasizing spacious roominess, unmatched visibility through the development of slender pillars and generous window glass areas.

So far as we can see at the moment, many cars will be styled in variations of the Lincoln-Zephyr motif. That doesn't mean a sameness of appearance but it does imply the unmistakable influence.

This trend means that the majority of makes have developed entirely new bodies, that each of the producers has emerged from the most important body design and die program in recent years. The new jobs feature curb entry, low floors, low roofs. This in turn has influenced big changes in chassis design—not necessarily revolutionary changes but a host of design problems occasioned by low-hung frames.

This is decidedly a Body year, yet there will be a profusion of mechanical changes not to be confused with the customary refinements and improvements. And in quite a number of cars you will find an entirely new chassis with interesting and advanced features.

'39 should mark an almost complete disappearance of the familiar "wobble stick" transmission gear shift. Majority of the cars, regardless of price class, will have remote gear shifting by a handle mounted under the steering wheel. Credit for the first development of this feature goes to Cadillac. They were the first to make manual remote control standard equipment at no extra charge. Pontiac adopted a similar hook-up, slightly different mechanically, which was offered at $10 extra charge on '38 models. Certain parts makers with imagination already are said to have designed a power shifting device which can be attached to the remote control, and this can be done so cheaply that many owners will be able to afford the luxury of power shifting without much added expense. Incidentally, this form of attachment lends itself to installation in the dealer's establishment.

Overdrive should have a glorious year what with remote control and the availability of a new overdrive transmission whose function is under the car operator's control simply by manipulation of the accelerator pedal.

Since the introduction of the Olds safety automatic transmission, Olds has installed almost 25,000 of its units. You will recall the Olds nationwide contest—$10,000 in prize money for the best letter on the operation of the automatic transmission. As a result of the contest, Olds should have an outstanding program for next year—watch for it.

Several other automatic transmissions are in fine shape. Don't expect them on '39 cars. But the outlook is very promising for them on the '40 cars.

With the progressiveness characteristic of Buick's policy, the organization struck out boldly last year with coil spring suspension all around. Buick will continue this

(*Turn to page 210, please*)

Experimental Procedure of

By J. M. CRAWFORD
and P. A. COLLINS,*
Chevrolet Motor Div.
General Motors Corp.

BEFORE describing the engineering organization and test procedure of the Chevrolet Division, it may be well to briefly outline its physical set-up, as well as its products, for both have an important bearing on the approach of the engineering department to its own problems.

Chevrolet differs from other large producers in many respects. Compared to one, whose manufacturing activities are concentrated, it is a division of a large corporation, with its major unit-manufacturing plants spread over a large area. Compared to others, it has world-wide assembly-plant facilities and a wider range of products.

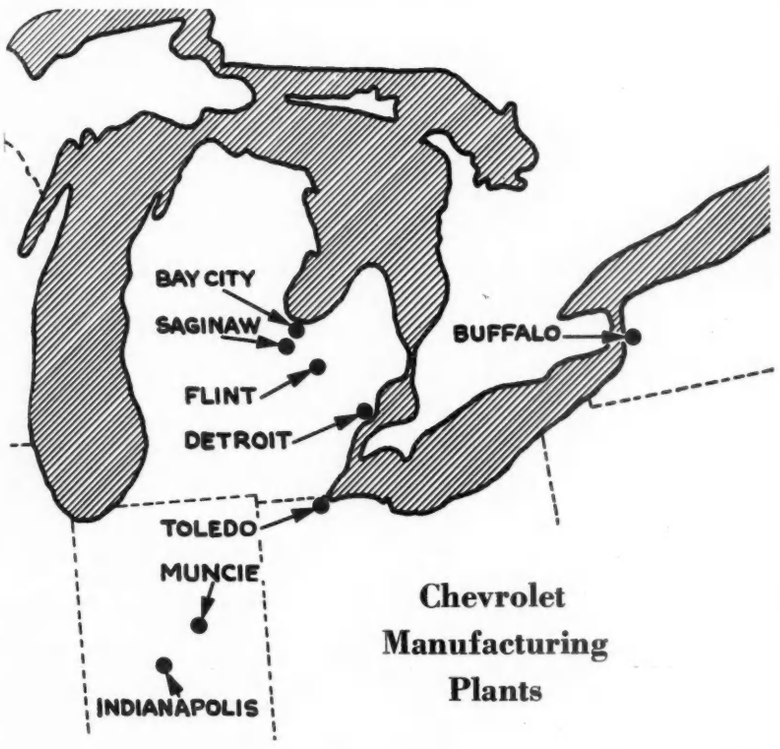
Chevrolet general offices are located in the General Motors Building Annex in Detroit. Manufacturing plants located in Detroit are those of the axle, forge, spring, and bumper divisions. The main engine plant and pressed-metal division is located in Flint. A plant in Bay City supplies carburetors, die castings, upset parts, and screw-machine products. Foundry operations for engine blocks, cylinder heads, transmission cases, etc., are concentrated in Saginaw. There, also, are located the main transmission plant and the service-parts manufacturing division. Other transmission plants are at Toledo, O., and Muncie, Ind. All commercial and truck bodies are produced in Chevrolet's own plant at Indianapolis. An auxiliary engine and axle plant started operations at Buffalo recently. The manufacturing plants have a capacity of 7000 units per day when working two eight-hour shifts.

In addition to the plants enumerated, there are eleven assembling plants scattered throughout the U. S., Flint being the f.o.b. point. General Motors of Canada and the Export Division assemble Chevrolet cars and trucks in twenty plants outside the U. S. A.

The products consist of two models of passenger car, differing mainly with respect to type of suspension, and three commercial models of different chassis design. Altogether, taking account of differences in wheelbase and in body type, there are sixty different models released for production.

The engineering department is spread over a considerable area, the same as the manufacturing department, and its own facilities for product development are augmented by those of the Corporation. The engineering executive offices and design departments are located on the ground floor of the general offices. The experimental laboratory and building operations are adjacent to the axle plant—a 15-min. drive from the main office. Plant and production engineers responsible to the engineering department in Detroit are located at Flint, Detroit, Saginaw, Buffalo, Toledo, Muncie and Indianapolis, and handle engine, axle, transmission and commercial-body problems. The Corporation facilities available consist of the GM Research Division, located across the street from the Chevrolet main office; the Fisher body engineering and styling section, in the same building, and proving grounds in Milford, Mich., and Phoenix, Ariz.

Functions and contacts of the various divisions of the engineering organization are outlined in a 29-page book, and in a Book of Procedure, which goes into more detail. Definite responsibilities are placed on each individual, as indicated in an Organization Chart, which shows the engineering department divided into three major groups—Design, Production, and Test.



Chevrolet Manufacturing Plants

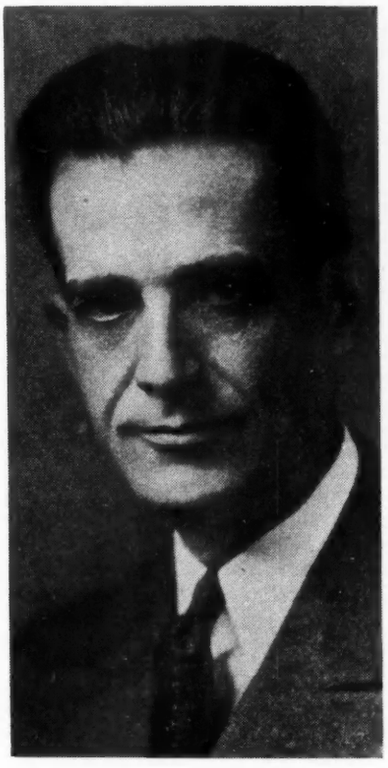
* Paper presented at the Summer Meeting of the S.A.E. Slightly condensed.

Testing at Chevrolet

Part One

Part Two will appear in an early issue

J. M. Crawford



P. A. Collins

The chief engineer establishes all policies and contacts with the management and departments within Chevrolet, and with Fisher Body, the styling section, and other Corporation divisions. He handles matters directly, or through contact men in various capacities in the engineering department. The engineers engaged in such contact work report back to the assistant chief engineer, whose duty it is to coordinate their work with the activities of the internal organization under his direct supervision.

In this capacity the assistant chief engineer is responsible for the coordination of all activities of the design, production, and experimental engineers, as well as for those of the drafting-room and records departments. The design-engineering division develops all new designs on paper, and is responsible until these designs are released to the production-engineering division. This does not mean that its interest ceases at this point; it is charged with the responsibility of following up the design until the model is discontinued, to see that no changes are made for production reasons which would alter the original requirements of the design; nor does it mean that this division is in absolute control of the design, as the production engineer brings in the plant engineers whenever his judgment dictates.

In practice, the production engineer is called in on the problem as soon as the basic principles of the design are established. His recommendations are given consideration, and the second design made incorporates all changes deemed necessary from the manufacturing and cost standpoints. In some cases, where manufacturing problems outweigh those of a technical nature, both engineers go to work on the problem simultaneously, and no samples are built until the manufacturing requirements are satisfied. This obviates designs going into production with last-minute changes due to the shop's inability to meet the specifications. Such changes do not allow time for tests, and unless they are of a very minor nature, they generally result in either field trouble or increased costs and delays.

Naturally, the plant engineer looks at the problem from the standpoint of equipment, either that in the plant or that available, whichever produces the best results for the dollar; and where new equipment is needed, by "letting the shop get in on the ground floor," enough time is allowed to thoroughly check the results before large commitments for equipment are made.

That the engineering and production departments are brought so closely together is largely due to the fact that the production engineer has a dual responsibility. He is responsible to his plant manager for production results, and to the control-office engineering staff for technical results.

Quality-checking of production parts is another function that brings the two departments together. Reports of quality, handled by a staff under the plant engineer, go to both the plant manager and the central engineering department in Detroit. The value of these reports to the inspection department is obvious; and the design engineers benefit by having their attention called to designs of which the specifications are difficult to control. And just as the engineering department has the privilege of checking up production, so the production department, through the plant engineer, receives reports of control-office engineering developments which are in any way likely to affect its future program.

There is no particular point at which the engineering department turns its development over to the shop to "clean up," with the hope that all will be well, for the interests of both are all pooled from the very beginning, to produce the best possible results for the money expended.

In addition to its advantages in developing products, the effect of the system on the development of men must be recognized. Plant engineers are strengthened by being "on their own" to a large extent, and cooperative efforts between departments always give the management the op-

Chevrolet Assembly Plants in the United States

portunity to observe man-power development through the opinions of many, rather than through department heads alone.

The experimental engineering division comprises the necessary group to build experimental material, to test and report the performance of experimental and production material, as well as competitive products, to supervise the design-checking of production material, to contact with the design-engineering division as to corrections and suggestions, and to prepare and tabulate necessary weight data and analyses. The experimental engineer is the contact between this division and design engineering, and all information is exchanged through him.

It is through the "work-order" and reporting system of this department that the development of a model is controlled by the engineering executives. In many respects this is the "watch dog" of the engineering organization, as well as the follow-up system. It enables all those responsible to take direct action to further the development, by keeping them in almost daily touch with all the details. The distribution of orders and reports is such as to encourage the cooperation of engineers other than those actually responsible for the design.

In this department the procedure is rigid and uncompromising in nature, as it not only must prevent defective design from getting into production, but also conduct fact-finding experimentation.

In outlining the problems of car design and development from the technical as well as the timing standpoint, and to explain why the development must be evolutionary rather than revolutionary, the 1937 model will be taken as an example, for the reason that it represented the greatest change yet made in any one year.

Every unit, except the front suspension-wheel unit, was completely redesigned. The decision to produce the 1937 model in its final form was made about the time its predecessor —the 1936 model—was started in production. This decision could only be made because it was based on designs of various major units that had been on the drawing-boards and on test since early in 1934. Chassis designs and body models based on the use of these units were completed December 1, 1935, or eleven months before the car was introduced to the public. The objective was to reduce the weight approximately 200 lb. and to increase the performance 15 per cent, without a reduction in passenger comfort, but with increased visibility.

The fundamental characteristics of the box-section frame, which must be considered in working out a new body design, were determined in 1934, and built into the 1936 Standard model. Thus, 40 per cent of passenger-car volume was used to work out the production problems presented by the frame. Draughting-room work started March 7, 1934.

The design of the hypoid-axle, on which the floor height and rear-seat position were based, was started July 9, 1935, at the central office, and on March 9, 1935, at the gear-and-axle plant. Tests of the axle began April 21, 1935. As in the case of this unit the manufacturing problems outweighed the technical ones, its development was taken in hand simultaneously by the engineering and production departments.

The transmission, on which the front floor height was based, was likewise a cooperative design, both new and old plants being given consideration; and the reduction in the weight of this unit, in spite of the increase in torque handled, could have been accomplished safely only by starting work on it quite early. The design was started July 31, 1934, and the transmission was put on test in November, 1934.

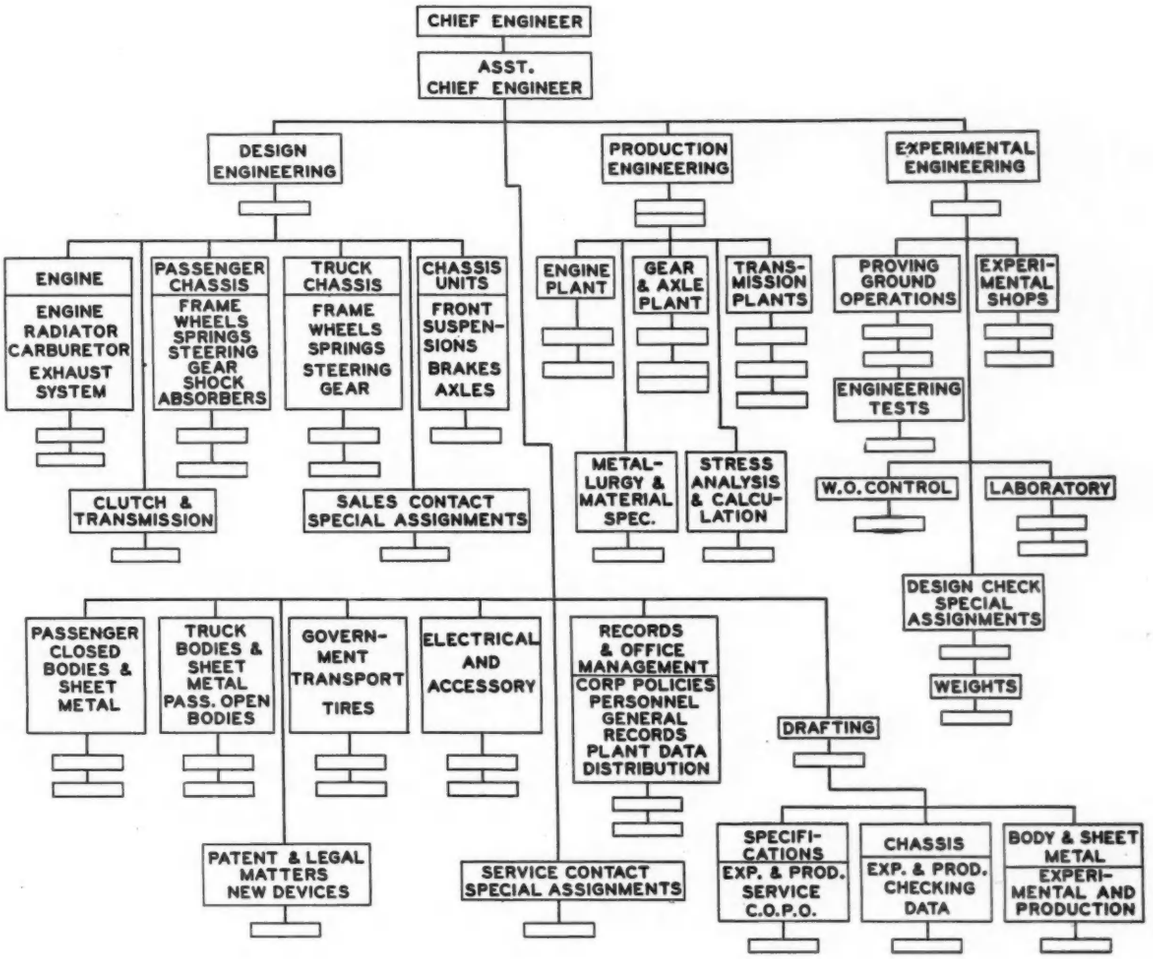
Engine development was undertaken with the object of increasing performance and smoothness, and at the same time reducing the weight and length. The aim was to permit maximum passenger capacity for a given wheelbase, and improved load distribution. The latter two factors were determined only after the length of the powerplant and the placement of the front suspension had been settled. The work on the powerplant started April 3, 1934, and the decision to use this engine in the 1937 model was based on the progress made by October 18, 1935.

Testing and development facilities used in connection with the above design problems were—like the balance of the organization—widely scattered. The GM Research Laboratories are used for gear testing, cold-room work, brake-and-clutch lining tests, analyses of the balance and stress conditions, and general chemical and physical problems. Harrison Radiator Division conducts all cooling tests in its wind tunnel. Dynamometers and other test equipment are under the supervision of the plant production engineers at the engine, transmission, and axle plants. Production chemical and physical test laboratories are also at their disposal.

Engineers of the central office have an experimental shop and laboratory of about 61,000 sq. ft. floor space, with facilities for making and servicing complete cars and trucks, including the body. The office force of the central office is set up to handle purchasing and all other problems in connection with the flow of material.

The laboratory, which has just been expanded to 13,150 sq. ft., comprises seventeen rooms with such

CHEVROLET ENGINEERING ORGANIZATION



equipment as dynamometers, chassis rolls, a carburetor-flow bench, stroking machines, etc.

The proving ground at Milford has, in addition to its speed loop and hill route, a complete chassis dynamometer and, in a separate building, a modern laboratory for sound determination. On the grounds, Chevrolet has its own quarters, and a staff reporting to the experimental engineer in Detroit.

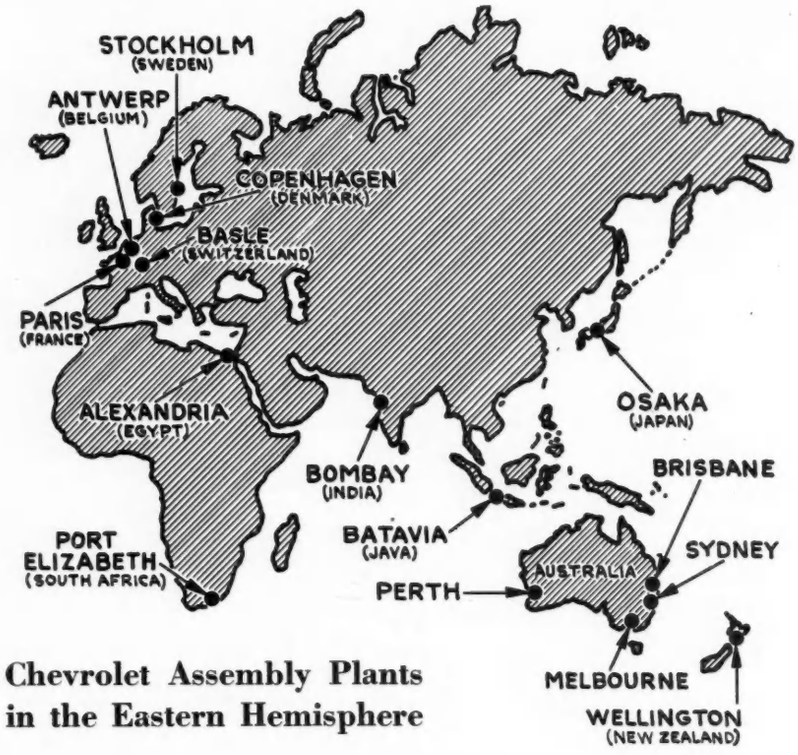
It is the responsibility of the experimental engineer to schedule and coordinate the work of these various organizations; and he has a staff in the central office in Detroit. The central-office engineer is responsible for coordinating the work done by the department, such as work-order control, maintaining of proper files, following up building projects, and all tests and field reports. He is also responsible for the distribution of all information obtained to the interested parties.

The contact engineer is responsible for design, for the checking of all designs, and for following them up. He also has supervision over the weight-analysis engineer, who handles all weight records of experimental and production details, and of competitive cars furnished by the GM Proving-Ground staff.

Projects handled by the experimental department originate with the executive staff and project engineers, who are responsible for new designs and for changes in parts that are controlled by the central office; and with the production engineers, who are responsible for changes in production material found necessary to facilitate manufacturing, and for the checking of material from various production sources.

To start a project through the experimental department, the project engineer first writes a design request to the chief draftsman, stating the changes to be made, and the reason; or he explains the idea back of the new design. This request must be approved by the assistant chief engineer, and it is then sent to the records department for proper numbering, typing, and distribution. The drafting room then proceeds to make up the necessary drawings, in collaboration with the project engineer who instigated the work.

If it is decided to build the parts,



Chevrolet Assembly Plants in the Eastern Hemisphere

a building-order request is written by the project engineer, which contains a description, the parts numbers, the number of parts, and the use for which the material is intended. This is sent to the experimental engineer's office for approval. This approval is necessary to prevent overlapping of projects and to plan the work to obtain the best results from the facilities available, the experimental engineer's office being in closer touch with the work being carried on in the experimental department.

When test work is required of this department, a request is submitted to the experimental engineer by the project or production engineer responsible for the particular unit or model. The experimental engineer's office determines where the best results will be obtained, and the request is then sent to the records department for numbering, typing, and distributing. In this way the basic number assigned to the design or building order is automatically applied to the test order. The drafting-room then issues the necessary drawing releases, parts list, and bill of material to the experimental department.

In the case of the production engineer, a request to test material is all that is necessary, as parts handled by this department have gone through the design and building stage previous to production, and in most cases they are parts from new sources to be compared with parts which already have been tested and OK'd. The chief engineer and other executives, as well as project and plant engineers interested in the development, receive copies of the test orders.

The primary purpose of this distribution of records is to prevent duplication of effort in a widely scattered organization, and to keep the engineering executives fully informed of details in their final stage of development.

The report system used at the proving grounds consists of daily reports on production and competitive cars, production-complaint reports, experimental complaints, development-work order reports, and final reports.

The daily report on production and competitive cars or trucks covers all work done on cars or trucks during the previous 24 hours, i. e., miles run, total miles to date, weather conditions, road conditions, and the schedule the car or truck is running on. This report is sent to the president of the company, and copies of it go to the plant management, chief engineer, assistant chief engineer, production engineers, and project or design engineers.

Development-work order reports on progress of experimental test material are written to the engineer requesting the test, and show the cars involved, the mileage on the material, and any work done or inspections made, and the findings. This report goes to the chief engineer, the assistant chief engineer, and the design and production engineers.

Production complaint reports cover individual production parts on which trouble has been experienced, and they represent a definite method of bringing to the attention of the production and project engineers the first indication of failure, or excessive adjustment of production parts. A complaint is made out by the superintendent of field tests, and sent to the experimental engineer's offices for approval and distribution. Such approval immediately starts a process that cannot be stopped until the complaint is "cleaned up." The complaint as issued covers the part, the car or truck involved, the cause of the trouble, the mileage run, the schedule used, the number of cars or trucks running under the same conditions, and whether the same trouble was experienced on previous models.

To permit of quick comparisons, a running average of all adjustments and failures on durability cars is maintained in a cross-index card-filing system. This file is available to the staff which fills out complaint reports. The complaint cannot be closed until it is definitely decided that the trouble has been eliminated, the "close-out" being authorized by the experimental engineer, whose office has a follow-up on all complaints, and issues a weekly memorandum showing the progress of all complaint reports. The proving grounds division issues a summary once a month, showing the status of all live complaints.

Progress reports on development and durability test cars or trucks have the same distribution as complaint reports on production durability cars, but the follow-up system

is eliminated. These reports permit all parties interested to suggest ways and means of overcoming defects shown by tests. A record of the behavior of production parts on these experimental models is made on the same form as the complaints on production durability cars, except that the color of the report form is changed. This is considered as extra information on production parts, or as showing the effect of related experimental parts on production parts.

In the development section all special testing is handled under the supervision of the development engineer. This covers all tests in which mileage is not a factor; such as brake-deceleration, car performance and economy, steering effort, handling and roadability, high-speed bearing tests, governor tests, cooling tests, and numerous other tests which require instrumentation.

The development engineer is responsible also for compiling final technical test reports designed to show results quickly without reading the complete report. In this report, the first item is the object of the text; next comes the conclusion formed, and then follow a description of the material tested, the method of test, and a complete log of the test. This development department, as well as the experimental laboratory, serves to give special training to young engineers to qualify them for advancement into the engineering department when vacancies occur. These men already have had experience as drivers and mechanics, and in office work and report-compiling; and in some cases they have already been in the laboratory and the drafting room, and are now following along in the development and special test department.

Durability tests on Chevrolet production cars and trucks, and competitive products, are handled by a staff reporting to the experimental engineer. This unit is in no way connected with the General Motors Division.

Complete cars are taken as delivered to the dealer, and run from 20,000 to 25,000 miles on a fixed schedule, using three shifts per day, rotating drivers daily, and allowing ½ hour at each shift for inspection by trained observers. The superintendent of tests and his assistant also ride the cars, to report operating conditions periodically.

Runs are made over a circuit of approximately 14 miles, consisting of the concrete speed loop, gravel and tarvia roads over a hill course, and one mile of Belgian-block road. A predetermined number of stops are made to check brakes and starts, clutch operation, and all other items usually covered in road testing.

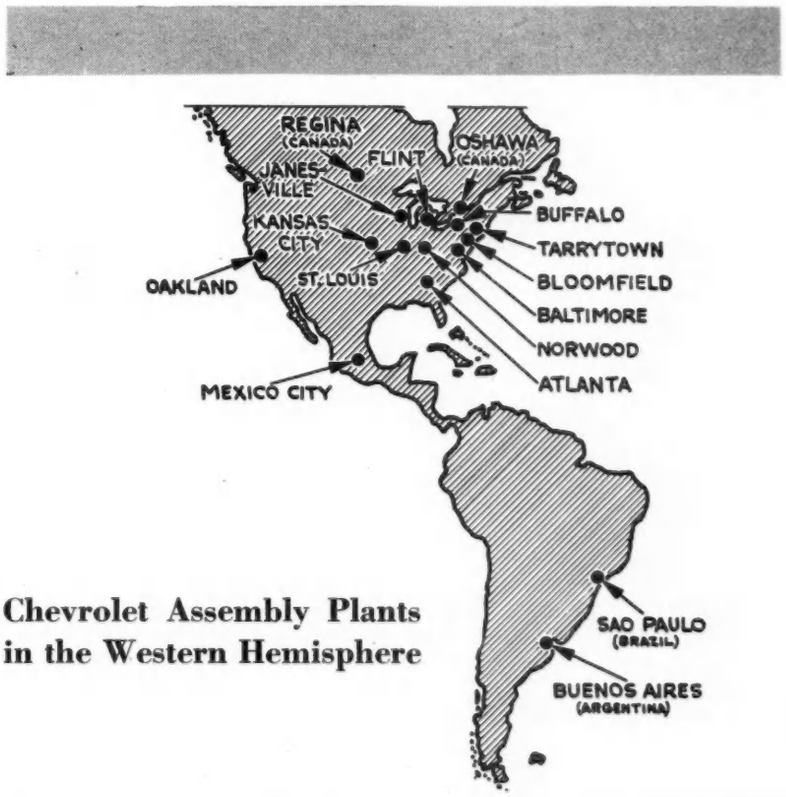
At the conclusion of these tests, the cars are completely disassembled in the Detroit experimental department, and laid out for inspection by the chief engineer, assistant chief engineer, design engineer, project and production engineers. The various units are then shipped to the plant production engineers for their inspection and reports as to wear, etc.

In comparing the results of these accelerated tests with cars in normal service, a ratio of 3 to 1 has been established. That is to say, parts passing the 20,000-mile point OK are considered satisfactory.

During the past 10 years, the Chevrolet division at the proving ground has averaged 1,440,735 miles per year; used an average of 134,712 gals. of gasoline and 10,232 quarts of oil per year. The average cost per mile is approximately $0.07. This covers salaries, wages, overhead, parts, gasoline, oil tires, maintenance, repairs, and changes of material. The personnel of the development and durability sections, under the test superintendent, averages 60 men, including drivers, mechanics, inspectors and special test and office men.

All parts of which the performance can either be measured or judged, must be OK'd by the development section before durability testing is undertaken. For comparison, regular production cars in standard condition are used. These cars are set aside for this particular purpose, and under no condition are they used for experimental work.

The concluding part carries the reader further into the details of procedure and will appear in an early issue of AUTOMOTIVE INDUSTRIES



Chevrolet Assembly Plants in the Western Hemisphere

Deco Injection Pumps

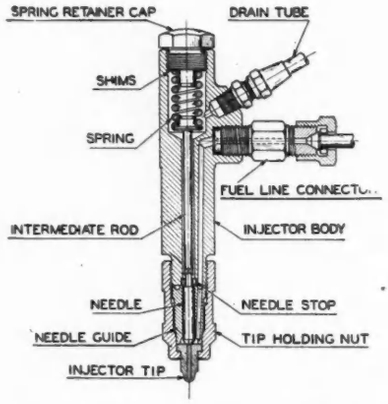


Fig. 1—Deco fuel injection valve

INJECTION equipment for oil engines, including injection pumps, transfer pumps, and injectors, is being manufactured by the Diesel Equipment Corp. of Chicago, under the trade name Deco. The firm has been in business for four years, and during the past three years has furnished the injection equipment used on Allis-Chalmers oil engines, among others, hence it has accumulated considerable experience. Of the injectors, more than 23,000 are said to have been built to date.

Fig. 1 herewith is a sectional view of the Deco injector. Fuel enters the injector body through the fuel-line connector and passes on through a drill hole to a circular groove cut in the top of the needle guide. From this groove it passes through three drill holes in the guide to the chamber just above the valve seat, which latter is formed by the top surface of the injector tip. By equally spacing the three drill holes around the axis of the guide, the pressure on the needle is equalized, and any tendency of the guide to wear unevenly is eliminated. The needle is a lapped fit in the needle guide, and has a large bearing surface therein.

When the injection pressure reaches the proper value, it raises the needle valve against the pressure of the spring. At the end of the injection period, quick closing of the valve is assured by the spring pressure and the differential area. Any fuel oil that may work past the injector needle will ultimately collect in the injector body and will be drained off through the drain tube.

The injector tip, or that part which extends into the combustion chamber, is held in place by the tip-holding nut. The design of the tip determines the shape of the fuel spray, its power of penetration, and its degree of atomization. Tips can be furnished to suit various forms of combustion chamber. Standard injectors vary from 21 to 45 mm. in diameter, and from 4½ to 18 in. in length.

Deco injection pumps are made in both single-unit and multi-unit types. All single-unit types operate on the constant-stroke principle. In models PV 1A and PV 1D the injection quantity is controlled by means of a spill valve, and the beginning of injection is constant regardless of the quantity injected.

Referring to Fig. 2, fuel is supplied from the tank to pump reservoir *A* through tube *B*. During the down-stroke of plunger *C*, fuel is drawn in to the pump chamber through suction valve *D*. When the plunger begins its up-stroke, fuel is discharged through passage *E* and discharge valves *F* into injection tube *G*. This continues until the spill-valve rocker *H*, engaging the plunger-spring cup *J*, lifts spill-valve tappet *K* and opens spill valve *L*, thereby permitting the remainder

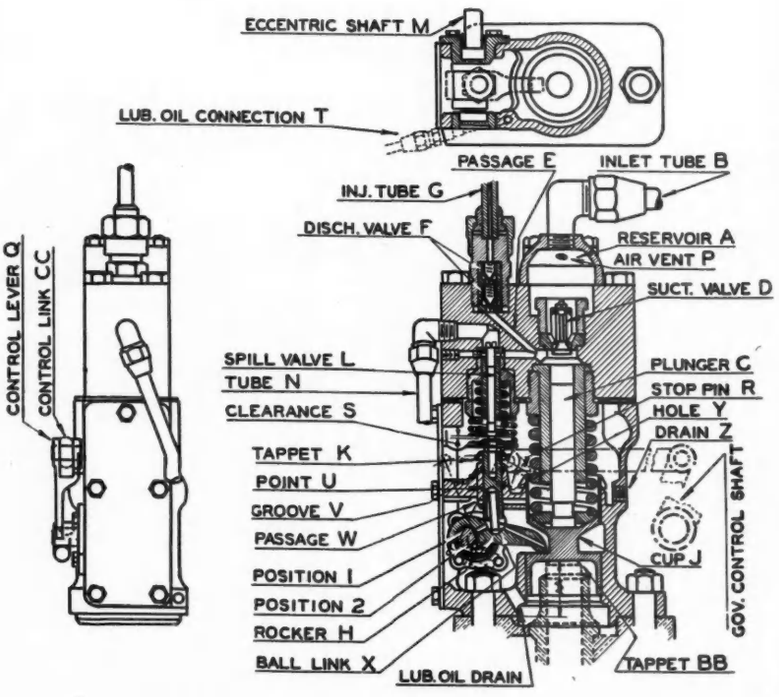


Fig. 2—Deco single-unit injection pump with spill-valve injection control

Have Two Types of Control

of the fuel displaced to return to the main fuel reservoir through tube *N*. The quantity of fuel delivered to the engine is governed by turning the eccentric shaft *M* to raise or lower the fulcrum point of rocker *H*, thereby changing the point of the cycle at which spill valve *L* opens.

The illustration shows tappet *BB* at the bottom of its stroke, and the control shaft eccentric *M* in the "Stop" position. With eccentric *M* in this position (position 1), spill valve *L* opens as soon as plunger *C* starts to rise, so that all of the fuel displaced is "spilled." At maximum load, eccentric *M* is in position 2. With plunger *C* in the lowest position and eccentric *M* in position 2, there will be additional clearance between the stem of spill valve *L* and tappet *K*, and plunger *C* will then force fuel through the discharge valve *F* until the clearance *S* is taken up and spill valve *L* is opened. The fuel reservoir *A* is provided with a vent *P*, which may be either piped back to the main fuel tank or else plugged and opened only when required.

Lubricating oil from the engine lubricating system is supplied to the pump at connection *T*, from which it passes under pressure through drill holes to point *U* on tappet *K*. Any excess oil that works its way up past the tappet collects in groove *V* and is drained back. The upper part of spring cup *J* is lubricated by oil which works down tappet *K* and collects in drill hole *W*. The upper end of ball link *X* is oiled similarly through the drill hole *Y*. Excess oil running down from spill-valve tappet *K* collects in the socket of spill-valve rocker *H*, and lubricates the lower end of ball-link *X* and the eccentric shaft and rocker-face bearing on spring cup *J*, through drilled holes in the rocker.

Fuel leaking past plunger *C* and the stem of spill valve *L* collects in the tappet chamber of the pump housing. Oil shields on spill-valve tappet *K* and spring cup *J* prevent dilution of the lubricating oil by this leakage fuel, which is drained out of the chamber through connection *Z*.

Another series of single-unit fuel-injection pumps made by Diesel Equipment Corporation, including Models PN1A, PN1B, PN1C and PN1D, has fuel-delivery control by means of a controllable by-pass valve. The fuel moved by the pump plunger leaves the pump chamber through both the delivery valve and a by-pass valve, and the proportion of the total delivered to the engine depends on the opening of the by-pass valve, which can be varied from the governor by means of a control connection.

Deco multiple-unit injection pumps Series PB, which operate on the variable-stroke principle, are built in 3-, 4-, 6-, and 8-unit assemblies. Two sectional views of a four-cylinder injection pump are reproduced in Fig 3. The pump comprises three main parts, viz.: the housing, the pump body, and the suction-valve cover, which latter serves as a fuel reservoir. The housing is made of cast iron, and its lower portion, which encloses the camshaft assembly, is entirely sealed off from the upper portion, so that any fuel which may collect in the upper portion cannot get into the lower portion and dilute the lubricating oil therein. To the finished upper surface of the pump housing is fitted the pump body, which is held in place thereon by two studs threaded into the housing, and their nuts.

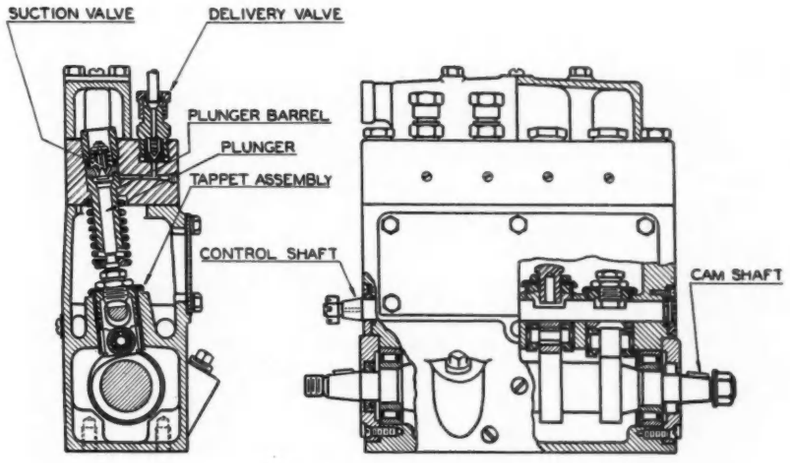


Fig. 3—Deco four-unit injection pump with variable-stroke injection control

An individual pumping unit for each engine cylinder, consisting of a barrell with plunger, suction valve, discharge valve, and tappet assembly, is securely fitted into the pump body. Directly above the barrel is the suction-valve body, whose lower portion is ground to form the valve seat, and whose upper portion acts as a guide for the valve. The valve is closed by a spring. There are several small holes in the suction-valve body directly above the valve seat, through which the fuel passes from the fuel manifold to the valve. The assembly of barrel, plunger, and suction valve is firmly secured in the pump body by a sleeve nut.

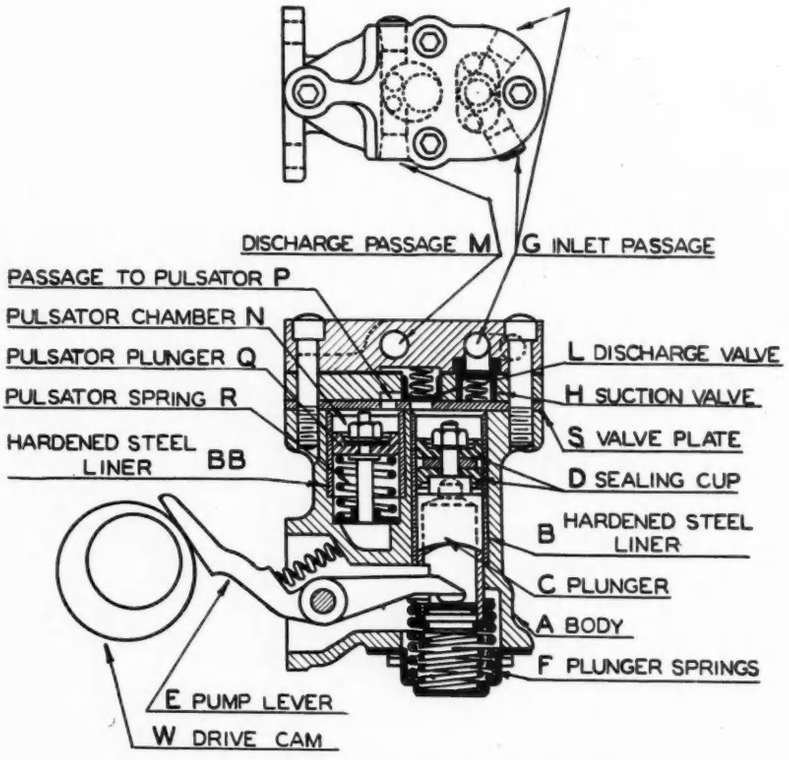


Fig. 4—Deco fuel-transfer pump with pulsator chamber

The lower end of the plunger is in contact with the tappet-adjusting screw, and the lower end of the tappet is provided with a roller acting as a cam follower. The entire tappet assembly is a sliding fit in the pump housing and rests on a flat on the control rod, against which it is held by the heavy plunger spring. The control rod, which extends the entire length of the pump housing, passes through all of the tappet bodies between the rollers and tappet screws. The section of the control rod within the tappet bodies is machined flat, and by its rotation, the plunger stroke, and, therefore, the amount of fuel injected per cycle, is controlled.

A sectional view of the Deco fuel-transfer pump for Diesel engines is shown in Fig. 4. It is of the plunger type, with a die-cast pump body, and automatically transfers fuel from the main tank to the injection pump at the rate at which it is consumed by the engine. Referring to the drawing, two hardened and ground steel lines *B* and *BB* are cast in the pump body *A*. Plunger *C*, provided with sealing cups *D*, is operated by a cam or eccentric *W* on the engine camshaft or on the fuel injection pump through the intermediary of lever *E*. The cam and lever move the pump plunger positively during its suction stroke, the return stroke being effected by springs *F*. In this way a predetermined pressure on the fuel will be built up by the pump, the stroke of the plunger being limited to that required to replace the fuel injected into the engine.

Fuel is admitted to the pump chamber through drill holes *G* and suction valve *H*, and is discharged through delivery valve *L* and discharge port *M*. In order to minimize pressure fluctuations in the delivery line, a pulsator chamber *N* is provided in the pump, which communicates with the discharge line through passage *P*. Within the pulsator chamber there is a pulsator cup *Q*, under the influence of spring *R*. Cup *U* is adapted to reciprocate in the pulsator chamber and takes up fluctuations caused by the reciprocations of the pump plunger, so that the pressure in the delivery line varies only slightly.

The suction and discharge valves of this transfer pump are hardened and have their seats on a hardened and ground plate *S* of stainless steel, and this combination of hardened valve and hardened seat is claimed to insure long valve life. The sealing cups *D* are of a synthetic material which is immune from attack by oil and water. This transfer pump will operate in any position.

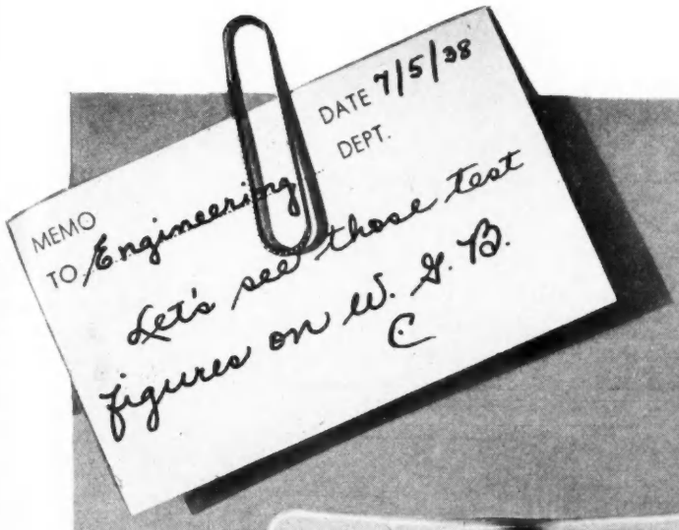
Engine Operation Under Part Throttle

A THEORETICAL analysis of engine operation under part-throttle conditions was made in a paper by Prof. L. C. Lichty of Yale University. The effect of throttling on the pressure and temperature of the working media in the cylinder, the work effects, and the heat transfer may be determined by analyzing the working process for various assumed intake-manifold pressures. With the throttle partly closed there is a considerable pressure drop in the medium upon entering the manifold. The temperature of the charge at the end of the suction stroke depends on the initial conditions of the fuel and air, the condition of the clearance gases, and the heat transfer during the stroke. In considering an ideal case, this heat transfer is neglected and the inlet-manifold pressure is assumed to have a constant value throughout the stroke.

By applying the energy equation and making use of the entropy and enthalpy charts for gases of combustion prepared by Hersey, Eberhardt and Hottel, the author calculated data and drew curves showing the variation of the percentage of clearance gases, the temperature at the beginning of the compression stroke, the temperature at the end of compression before and after combustion, the temperature at the end of expansion, and the temperature of the exhaust gases as a function of the inlet-manifold pressure. Next the effects of dilution on the work effect were investigated, and data for pumping work, net indicated output, and efficiency were calculated.

Presented at SAE Summer Meeting.

THE petroleum reserves of Irak—writes Ghazi-el-Amara to *Chimie et Industrie*—are estimated at 395,000,000 tons, and if the present rate of production is maintained, they will last for another 110 years, "whereas the total world reserves are sufficient only for 18 years, and those of the United States only for 15 years."



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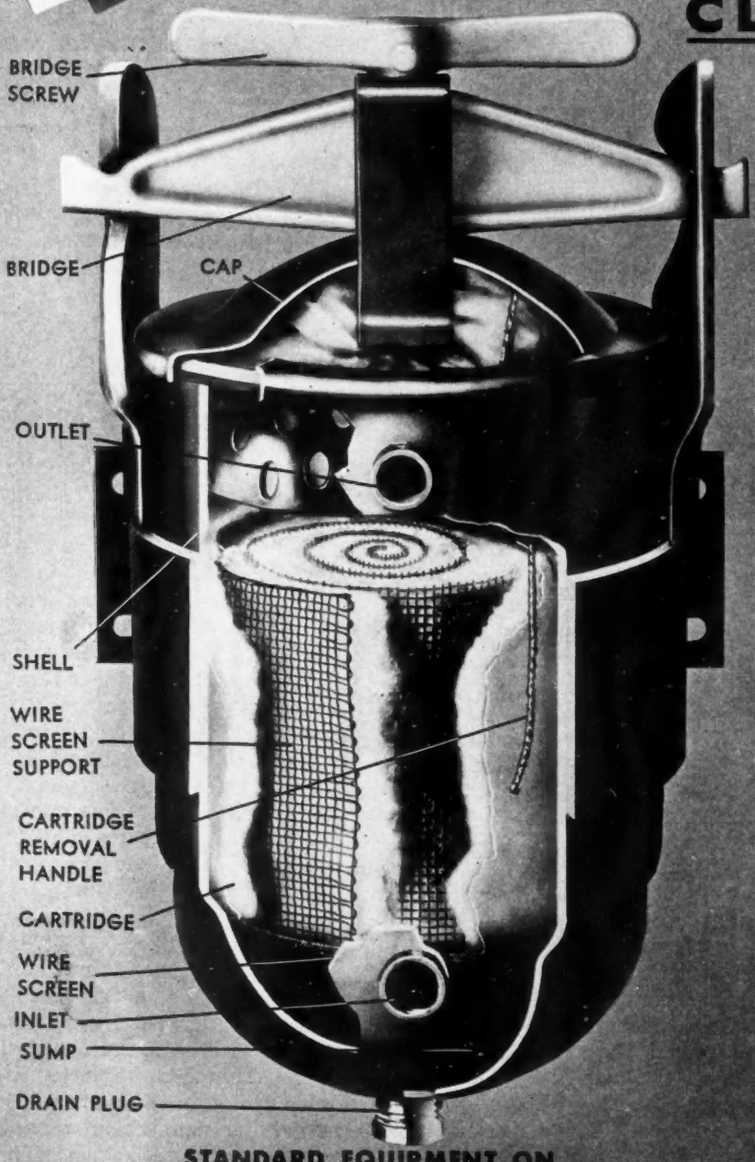

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Ford Obtains Another Rear-Engine Patent

ANOTHER patent on a rear-engined car was issued to Henry Ford on July 5 and assigned by him to the Ford Motor Co. This patent, No. 2,123,005, bears the title "Motor Vehicle" and was applied for May 13, 1937.

The invention provides for such an arrangement of the mechanical units that their weight is approximately equally divided on opposite sides of the center line of the chassis and that there is no need for accurate alignment of the various driving shafts.

As shown by the drawings reproduced herewith, an eight-cylinder Vee engine is installed transversely in back of the rear axle and to one side of the vertical center plane of the vehicle. The engine block is bolted directly to one half of the final-drive housing, the other half of this housing being cast integral with the transmission housing, which is in line with the engine crankcase but on the opposite side of the vertical center plane of the vehicle. The transmission housing is cast integral also with a flywheel housing. The engine forms one end of the driving unit, while the flywheel housing forms the opposite ends. Within the flywheel housing are enclosed the flywheel of the engine, a conventional single-plate clutch, and an electric machine which will serve either as a starting motor or a generator. The engine and driving unit are supported from the vehicle frame at three points. Within the final drive housing there is a differential unit to whose side gears the axle shafts are connected through universal joints of the constant-velocity type. The axle housings have universal mountings on the outside of the final-drive housing concentric with the universal joints of the drive shafts, and the axles, therefore, are of the oscillating or independently sprung type.

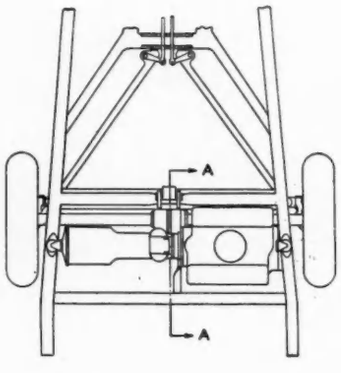


Fig. 1—Plan view of rear end of rear-engined chassis patented by Henry Ford

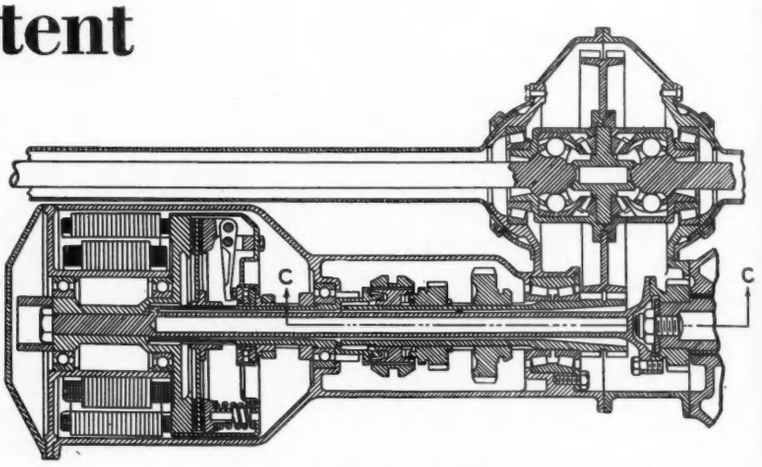


Fig. 3—Sectional view of electrical unit, clutch, transmission and final drive (section B-B in Fig. 2)

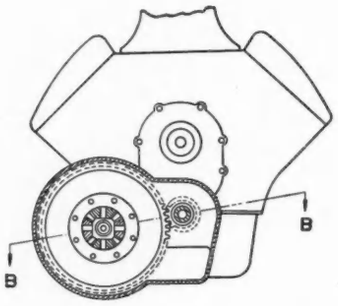


Fig. 2—Section through final-drive housing showing end view of V-eight engine (section A-A in Fig. 1)

At the outer end of the flywheel housing there is a plate formed with an integral hub on which is mounted the stationary field frame of the electric machine and within which are formed seats for ball bearings supporting the flywheel and the outer end of the hollow shaft by which the flywheel is connected to the engine crankshaft. Owing to the considerable length of the shaft connecting the flywheel to the crankshaft, any slight lack of alignment between the engine bearings and the bearings for the flywheel hub would result merely in flexing the drive shaft and would have no detrimental effect on the bearings. The armature of the electric machine is secured to the outside of the flywheel and surrounds the stationary field frame. When it is desired to start the engine, rotation of the armature of the electric machine cranks the engine directly. The armature, of course, continues to rotate as long as the engine is running.

On the engine side of the flywheel is located the single-plate clutch, which is operated by means of the usual clutch shifter collar; when engaged, this clutch places the main drive pinion in the transmission case in driving connection with the flywheel and the crankshaft. The transmission is of the usual three-speed sliding-gear type, and it will be noted that a pair of synchronizing clutches are shown interposed between the main drive pinion and the intermediate-speed gear. All sliding members of the transmission are mounted on a sleeve surrounding the shaft

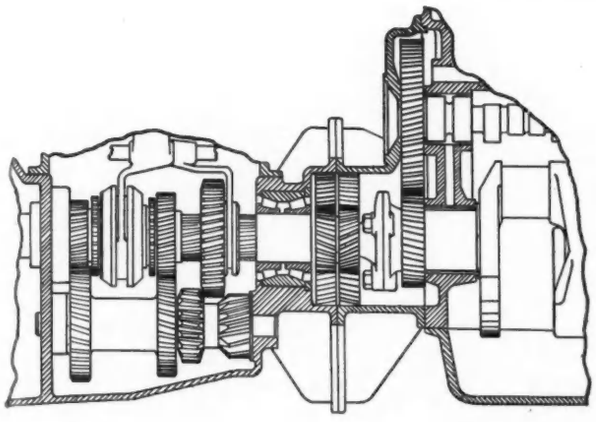
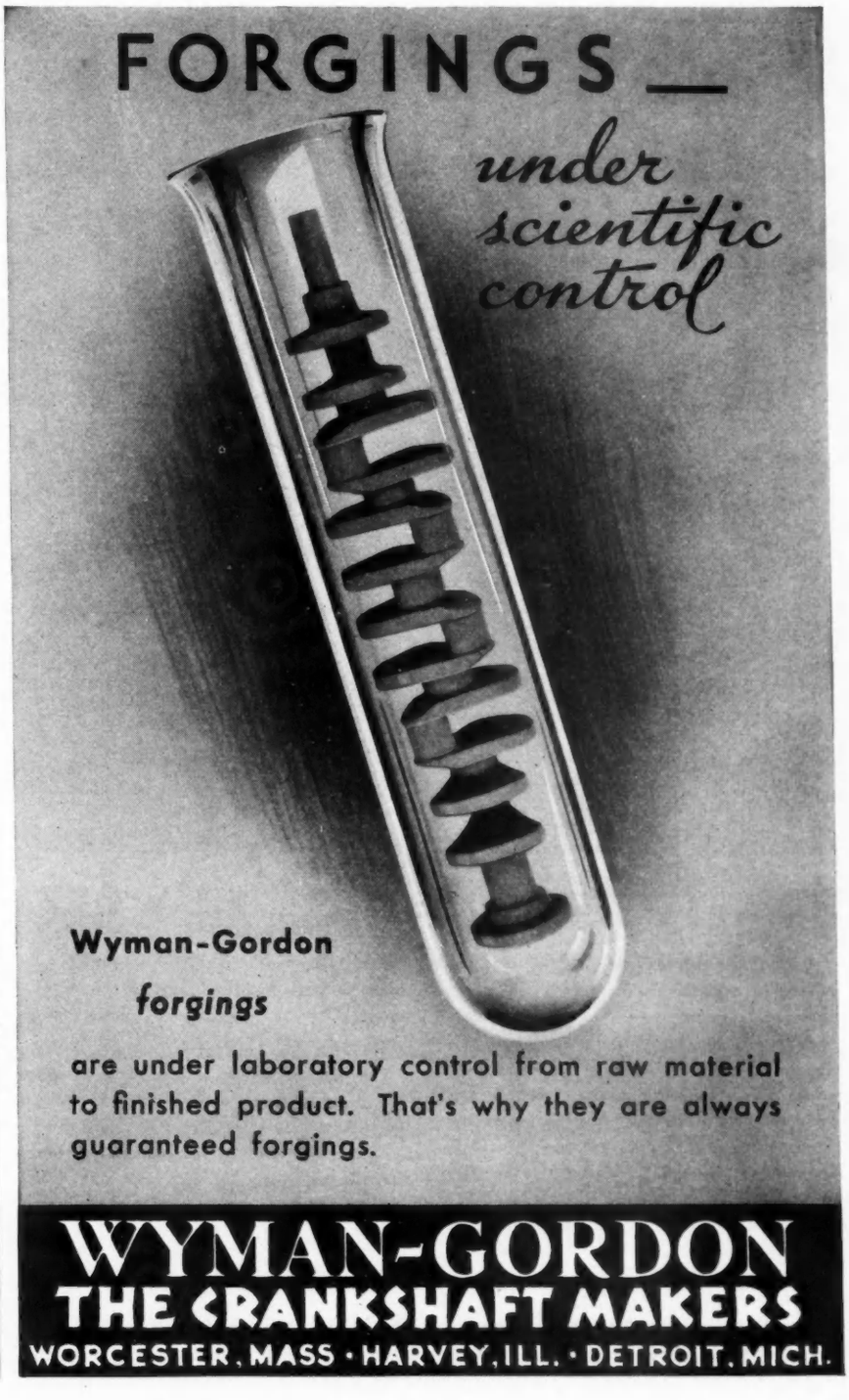


Fig. 4 — Transmission and final-drive assembly (Section C-C in Fig. 3)

extending between the crankshaft and the flywheel. This sleeve has a roller-type pilot bearing in the main drive pinion, and a conical-roller bearing in the transmission housing. Just outside the transmission housing and inside the final drive housing this sleeve carries the final-drive pinion, shown as of the herringbone type, which meshes with the final-drive gear on the differential unit. Considerable axial clearance is maintained along the length of the flywheel-drive shaft, to permit axial play between crankshaft and the axially-fixed flywheel.

Among the advantages which Mr. Ford claims for the construction patented by him are that it distributes the weight of the driving unit substantially equally between the two sides of the car; that the flywheel is assisted in its function by the weight of the armature of the electric unit; that the arrangement of the clutch and transmission between the engine and its flywheel is unique; that each differential side gear and its adjacent universal joint half is formed as a single sleeve, which permits of locating the pivotal axes of the axle shafts closer to the center of the car, thereby reducing the angular motion of the axle shaft for any given vertical motion of the road wheels, and that the substantial clearance between the flywheel-drive shaft and the sleeve of the transmission permits of taking up the engine main bearings without causing binding between the drive shaft and the sleeve of the transmission.

A NEW type of road pavement with dust-free surface is under development in British India, and is said to have given very encouraging results so far. The sugar industry of that country produces enormous quantities of molasses as a by-product, and this molasses is now being admixed with asphalt and tar and treated with sulfuric acid for use as a road binder. The pavement thus produced is said to be very resistant and not to be softened by the heat of the sun. The price of the mixture is no lower than that of ordinary asphalt. Small communities employ a somewhat different procedure. They make mixtures of quenched lime, crushed charcoal, and molasses in the proportion of 2:1:4 and apply it to the road surface, which can be opened to traffic 24 hours later.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New Conception of Styling Will Mark 1939 Cars

(*Continued from page* 197)

suspension, undoubtedly with important refinements. Too, we believe that at least one other important name will be added to Buick's as featuring coil springs all around.

Last year, Chevrolet pioneered what appears to be the first fundamental departure in clutch design in many, many years. Chevrolet had remarkable success with this clutch last year. Suffice it to note that at least one other car maker will adopt the same type of clutch for '39, in a larger size. Moreover, this development has stimulated thought along other fronts. One fine name will have a conventional clutch redesigned in a manner which is amazingly simple, but more important, its designers feel that the cost will be very low. Still another important car manufacturer will enter the field with a unique clutch having only nine parts, six of which are simple spring clips.

Remote control of gear shifting is bringing to the fore a much simplified transmission—smaller, more compact, lighter, and somewhat less expensive to build.

With the current trend in styling radiator grilles of high grade zinc alloy die castings, in lustrous chromium finish, emerge in an entirely new form.

Hypoid gearing finally completes its dominance in motor car rear axles. At least three new names added to the impressive list of last year constitute an almost clean sweep of the entire industry. Several years of high production not only have smoothed the production picture but have completely cleared the atmosphere so far as rear axle lubrication is concerned. E-P lubes should have good sailing come next year.

Returning to the subject of styling, the new trend will clean up the front end and will introduce some novel forms of lamp mounting. In a few cases, the lamps will be faired in the front fenders—as on Graham-Paige and Willys last year. In some cases, the car buyer will have the option of taking the car with or without running boards, the vogue pioneered by Cadillac last year. In several designs the running board may disappear entirely.

Color, a feature purely psychological and as changeable as the weather, will be gay next year, heralding emergence from depression feeling. According to a prominent stylist, color will pervade every design element—exterior paint, interior trim. More plastics will be used and will feature color. In some instances, color will invade the field of chromium plate on hardware and ornaments. You will recall that Ford pioneered the use of harmonizing color on interior hardware for deluxe jobs quite some time ago. We understand that there is a decided tendency to use a harmonizing plastic color finish on hardware, both interior and exterior. Another possibility is a chemical dip color finish available in a variety of subtle shades and tints, based on a chemical process developed some years ago by United Chromium.

Concealed hinges are slowly coming into their own. There will be more concealed hinges on the new cars and if certain promising de-

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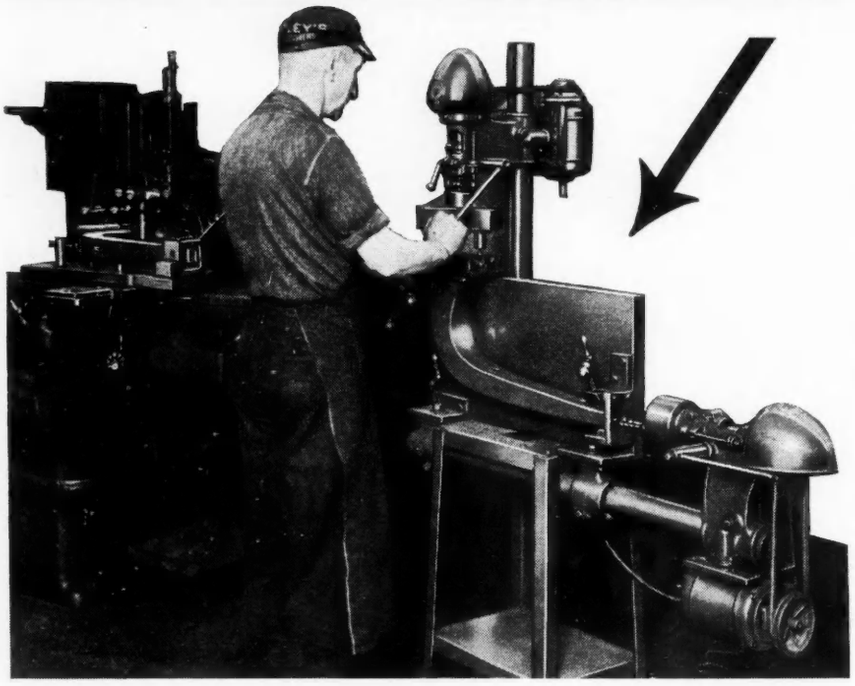

HOW TO PUT IDLE TIME TO WORK!

This photograph shows the milling and drilling of an overarm for a scroll saw. The operator loads the arm in the milling machine, starts the first cut, then loads a previously milled arm into the special drilling fixture set beside the milling machine and drills four holes in the arm. By the time this operation is completed the first cut is finished on the milling machine. The arm on the milling machine is then indexed for the second cut, and, while this cut is being made, the operator transfers the drilled arm to another Delta drill and taps two holes. The drilling and tapping operations are done during the time that the operator would otherwise be idle—so these operations cost nothing for labor!

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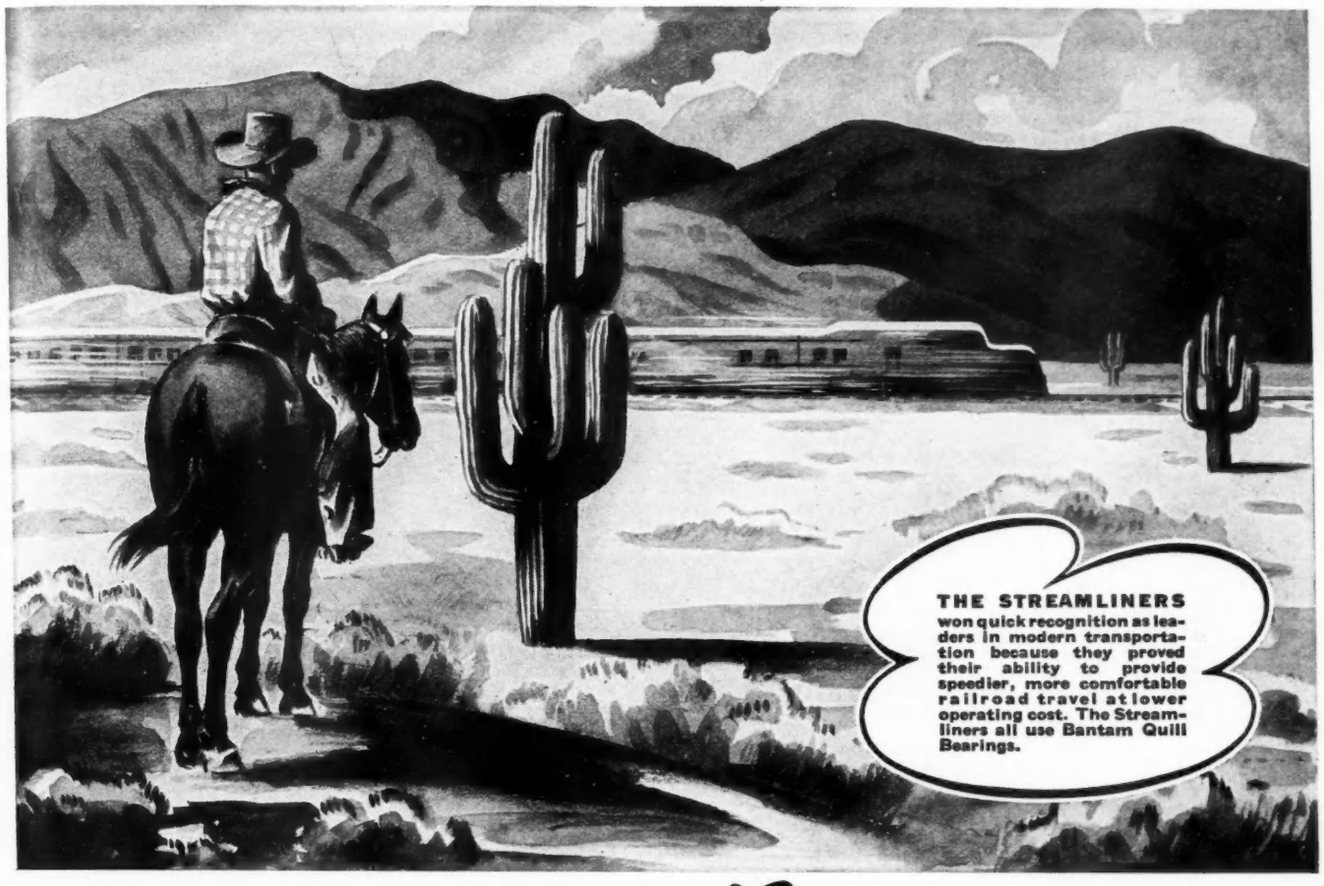
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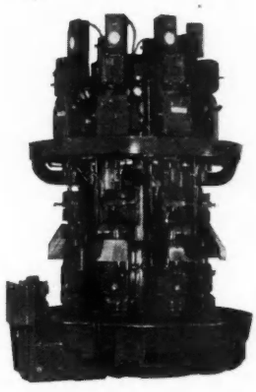

FOOT-BURT
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This Continuous Type Drilling Machine, made by the Foot-Burt Company of Cleveland, Ohio, has 16 spindles for drilling wrist pin holes in pistons. Bantam Bearings are relied upon in this precision drilling operation.

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signs come through, we may well see concealed hinges as standard equipment on '40 cars.

While nothing radical is expected in engine design, there will be a few new engines and many important refinements. Zero-lash hydraulic valve lifters, as pioneered by Wilcox-Rich, continue as a basic feature on a number of makes. During the past year we have noted several promising designs for automatic valve lifters of various types so that we may anticipate an interesting period of development after the new models are out of the way.

The past year has seen an overwhelming trend to piston rings featuring a coated surface for prolonging the useful life of cylinder assemblies. Certain major piston ring producers—Perfect Circle, Sealed Power, McQuay-Norris, to mention a few, have rings with special coatings for this purpose. Interesting by-product of this activity is the fact that certain of these protective coatings are being used for other parts of the engine where wear is a serious problem. Thus, for example, one motor car manufacturer will produce his own barrel type valve tappets treating the contacting surfaces with Ferrox (Perfect Circle process).

"Superfinish" a special manufacturing technique developed by Chrysler is being used for the finishing of many important engine parts such as crankshafts, camshafts, tappet faces, pistons, wrist pins, valve stems, etc., and will constitute an outstanding engineering and advertising feature.

Last year marked intense activity in spring suspension development and improvement in the ride. It seems quite certain at this writing that practically every car name with the possible exception of Ford and the independents, will feature coil spring independent front suspension. This development undoubtedly encouraged a resurgence of activity on the part of the Leaf Spring Institute, and as a result, the Institute has brought to the fore some fundamental improvements in leaf spring design in combination with unique shackle arrangements. It should not be surprising to find some examples of variable spring rate leaf spring designs spotted here and there on '39 cars as a result of this program.

As an intimation of things to come, a number of prominent producers of Sixes and Eights each are grooming a third car—a small Six, priced competitively. However, there is no indication whatever that anyone will be in the market with a strikingly lower priced car this year. If and when the really small cheap car comes, one body stylist is quite certain that it will feature integral body and frame construction, making for lightness and simplicity.

A prominent engineer, who has picked his shots before, tells us that in his opinion the next minor design change will be location of hand brake lever in the center under the instrument board where it was some short time ago. This is an ideal location with the elimination of the "wobble stick." Incidentally, we might point out that the location of the gear shift control under the wheel clears the path for the next big push, namely an automatic transmission.

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